

ELEMENTS
OF
ANALYTICAL PSYCHOLOGY

*A short course adapted as an
Introduction to Philosophy*

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FIFTH EDITION

CALCUTTA
S. K. LAHIRI AND CO., COLLEGE STREET
1920

ANALYTICAL PSYCHOLOGY

AS INTRODUCTION TO PHILOSOPHY.

PART I.

INTRODUCTORY.

SCIENCE AND PHILOSOPHY OF MIND.

I.

SCIENCE NATURAL AND MENTAL.

§ 1.

The world of reality appears to us to have two opposite and correlative poles—that which thinks and that which is thought. That which thinks is *mind*. That which is thought is *nature*. But mind, in thinking nature, thinks also itself, that is, is conscious of itself as thinking nature. Here then there are two spheres of possible knowledge—knowledge of nature as what is thought, and knowledge of mind as what thinks together with its processes of thinking. But the two opposite poles of mind and nature seem to be connected with each other by life—life seems to rise out of nature, and mind seems to rise out of life. Thus mind, in thinking itself and nature, also thinks life as the connecting bond between itself and nature. Hence a third and intermediate sphere of knowledge is that of the processes and conditions of life.

Thus, there appear to be in the world three principal stages of development—from hitherto unknown forces to the molecular matter which is the substance of physical *nature*; from matter to *life*; and from *life* to *mind*. In the first stage, so far as it is known to us, we find at work only the *physical forces* of attraction and repulsion in their mechanical, chemical, electrical and thermal forms, producing motion, impact, integration and

Two poles of reality—thinking and that which is thought,

Connected into one concrete whole by the bond of life

Hence three stages of development, and therefore three departments of knowledge and three classes of sciences:

equilibrium, and thereby atoms, molecules, suns and planets. In the second stages, that something which we call *life* appears, which works in the physical forces of matter, and given them a new character and new directions, making them build up the atoms of matter into cells and tissues, and making them subservient thereby to its own development and preservation in plant and animal organisms. In the third stage, that something appears which we call *mind*, which knows and lays hold of the forces of nature and life, and makes them subservient to the evolution of self-conscious, self-regulating, and self-perfecting spirit.

Hence the sciences will fall naturally into three classes corresponding to these three stages of development and complexity :—

Sciences of physical forces and inanimate materials.

Sciences of life and living things

And sciences of mind and products of mind.

The fundamental science dealing with mind and mental state.

(a) The *Physical Sciences*, which seek to understand the constitution and the processes and products of matter—to ascertain the elements of which material things are composed, and the laws according to which the material elements combine and separate, and form the atoms, molecules, gases, liquids, metals, rocks, suns and planets which constitute the physical world.

(b) The *Biological Sciences*, which suppose the knowledge of matter and material laws supplied by the physical sciences, and seek to discover how the materials of nature rise from inorganic to organic and living forms—from atoms and molecules to cells, tissues, organs and thereby to living plants and animals—and the conditions and laws according to which organisms live and grow, and

(c) The *Mental Sciences*, which suppose the knowledge supplied by the physical and biological, and seek to discover how, in living organisms, mind originates, and to understand the states, activities and products of mind—in other words, how life comes to be supplemented by consciousness; and how consciousness, from elementary sensibility, rises to ideas and beliefs, emotions and volitions; and from these produces arts, languages, literatures, sciences, religions, social and political institutions, and all the mental developments recorded in history.

Thus as there are several physical sciences dealing with the various properties, processes, and products of matter (mechanical, chemical, thermal, electrical); and several biological sciences dealing with the various forms under which life

manifests itself (with bacteria, algae, mosses, trees, insects, molluscs, fishes, birds, mammals), so there will be several sciences dealing with mind, and the various functions, applications, and products of mind in history, science, art, religion, society, politics. But, with regard to the mental sciences, we can see that there will be one fundamental mental science lying at the basis of all the rest, viz., one which seeks to explain the essential nature of mind as it grows and works in every individual, together with the fundamental mental states and activities of which science, art, politics and religion are applications and products. This fundamental science of mind is now commonly called *psychology*.

and activities
is now called
psychology.

By psychology in general, therefore, we understand *that science which investigates the nature, origin, and growth of mind, together with the states and activities which are essential to mind, and the conditions and laws to which mental states and activities are subject*. As physical science deals with matter and its properties of gravitating, flowing, vibrating, attracting and repelling, integrating and disintegrating; so psychology deals with mind and its powers and capacities of touching, seeing and hearing, of perceiving, remembering, imagining, understanding and reasoning, of feeling, fearing, hoping, sympathizing, of deliberating, judging, choosing, willing, and realising its volitions by action.

Hence psy-
chology may
be defined
thus.

But mind, so far as it is known to ourselves, manifests itself in and through a physical organism, and in constant interaction with a material world. Thus (1) the individual mind manifests its feelings, thoughts and volitions to other minds by occasioning changes in its own physical organism—processes of brain and nerves, and contractions of muscles and movements of limbs—which again produce changes in the external material world. Therefore we cannot understand how our will produces its desired effects without understanding the bodily processes through which it does so. And (2) it is by becoming conscious of changes produced in its physical organism by external things that mind becomes aware of the existence of physical things and, through them, of other minds. Indeed one mind can know the existence of other minds only through their manifestation of themselves in bodily movements. Thus the mental processes cannot be fully understood without understanding at the same time the physical processes which are

But mind
realises and
manifests it-
self in certain
states and
processes of
body. And it
is only
through pro-
cesses of body
that it knows
the existence
of other
things and
other minds.

Therefore psychology must include the investigation of these bodily processes also.

Hence fuller definition.

Different terms for mental study;

Psychology,

Mental and moral science,

Philosophy of mind.

But the terms 'science' and 'mind' themselves require definition.

inseparably connected with them. In other words, we cannot explain our own knowledge of the world therefore without understanding the physiological processes through which we obtain our knowledge. And indeed certain physical processes of organism and certain mental processes appear to be so dependent on one another reciprocally that the one series cannot go on without the other. Therefore the direct study of the mental processes requires to be supplemented by the study of the corresponding organic processes of brain, nerves and muscles. Hence the study of these may be considered common ground to mental and biological science, and psychology proper will have to be supplemented by 'physiological' psychology. Therefore the statement of the province of psychology given above requires to be supplemented with this additional clause ; and the processes of the organism through which mind manifests its own existence and enters into communication with the rest of the world, chiefly those of the nervous and muscular systems.

The word *psychology* (science of *psyche*, soul or mental substance) was first used by the logician Goclenius, (1590) as the title of a work on the nature and origin of the human soul. It was little used until about the middle of the 16th century, when it was gradually adopted to mean *science of mind*. It has been restricted generally, however, to the nature and processes of the individual mind. The term *mental and moral science* has been used in a more comprehensive sense to include both this and the study of the products of collective mind, as in ethics, logic, sociology, history, politics, art and language. And the term *philosophy of mind*, again has been used, in a still more comprehensive sense, to include the study not only of the processes and products of mind, but also of the ultimate nature and substance of mind itself, and its relation to the rest of the world of finite things, and to the absolute creative power out of which they rise.

§ 2.

But the words *mind* and *science* are capable of several shades of meaning ; and the meaning and province of psychology as science of mind will depend on what precisely is meant by *mind*, and by *science*, and on the characteristics which distinguish *scientific* from other kinds of knowledge. We proceed therefore to consider the senses in which these words are now commonly used. Hence

I. *As to the term Science*—the term is used—

(a) In an abstract sense for the *activity* and *process* of analysing things (or *phenomena*, as it is customary to say) into their constituent parts and elements, and discovering the causes which have made them to be what they are, and their properties or powers of causing effects in other things, and the laws according to which the forces which produce them operate, and according to which the forces operate which they themselves exercise on other things. In other words, science in this sense is the attempt to ascertain the constitution of things, their causes and effects, and their laws of operation. It attempts to answer the questions, what? why? and how?—*what* things are (their *constitutions*); *why* they are what they are (their *causes*); and *how* they come to be what they are (the *laws* of their *causes*).

Thus the scientific study of a plant will consist in dissecting the plant so as to discover the cells, vessels and tissues of which its different organs—root, stem, leaves, flowers—are made up; analysing the materials contained in its cells and tissues to ascertain their chemical constitution; determining the functions or kinds of work performed by its different tissues, and organs, and the manner in which they all co-operate together to promote the life of the whole; and the properties or powers which it possesses of affecting other things, that is, its nutritive, chemical, medicinal, and industrial qualities; and the forces and laws of nature which have led to its development and multiplication.

Cosmology studies the constitution of the different bodies which make up the material cosmos—nebulæ, stars, planets, satellites, suns—and the forces with which they act on one another and hold one another together in moving equilibrium and the causes which have made them to be what they are, and the laws or ways in which these causes uniformly operate.

Chemistry resolves material compounds into their constituent atoms and molecules, and ascertains the proportions of each, and the laws according to which they come together to form compounds, and their properties, i.e., powers of producing effects on other things separately and in composition.

(b) The term science is used also in a more concrete sense for the collective *products* or *results* of the above processes of investigation; in other words, for the body of *general truths* that have been arrived at by the separate and special study of some *particular* department of the world; and have been co-ordinated with one another into a connected system; and have been established by *reasoning* which is demonstrative

(a) Science is used for a certain activity and process of mind viz., that of investigating the nature, causes and laws of things.

As for example in Botany;

Astronomy,

Chemistry.

(b) It is also used for the results or products of that mental activity, viz., the knowledge obtained by systematic investigation.

or approximately so; and can be *verified* by experience. Thus the whole system of truths that have been discovered regarding the origin, and relations of sun, planets and stars, constitutes the science of astronomy; those regarding the growth, structure and life of plants, that of botany, and so on. These, then, may be taken as the characteristics which mark off scientific from other knowledge. And

And know-
ledge to be
scientific
must consist
of :
Truths of
general
application

(1) By scientific truths being *general*, it is meant that they express what is true not merely of particular things here and there and particular place and times, but of all things universally of that particular class and kind. That 'this copper coin is rusted' is universally true, and therefore a scientific truth.

Connected
and systema-
tized.

(2) By their being *co-ordinated*, it is meant that they have been shown not only to be consistent with one another, but to be connected with one another reciprocally as conditions and consequents, causes and effects, or effects of the same cause. That the tides rise and fall twice in twenty-four hours, that the earth is an oblate spheroid, that the moon revolves with one side always to the earth, have been co-ordinated or connected with one another by showing that they are effects of the same cause, *viz.*, the same force of gravitation.

Established
by reasoning
consistent
with the
rules of
logic, and

(3) By their being *demonstrated*, it is meant that they have been reached by processes of reasoning which satisfy the logical conditions of proof, as distinguished from propositions resting on mere conjecture or probability. That spots on the sun have some connection with drought and famine on earth is still a matter of conjecture, but that they are connected with disturbances of the magnetic compass and displays of aurora in the northern sky, is demonstrated.

Consistent
with facts of
experience :

(4) By their being *verifiable*, it is meant that every new fact that turns up can be shown to be consistent with them, and to be such that it might have been deduced from them. Thus the general truths of astronomical dynamics are *verified* by the occurrence of eclipses, occultations, transits and the like, at the exact moment predicted.

And is dis-
tinguished
from philo-
sophy by its

(5) And by the truths of each science having reference only to a particular *department* of the world, it is meant that the process and products which constitute the phenomenal world

bearing only
on particular
departments
and aspects
of things,

divide themselves into distinct stages and branches ; and the laws of one stage, department or aspect can be studied and understood, to a certain extent at least, apart from those of another ; and that the different sciences apply themselves to different departments, because without such division of labour knowledge would make little progress. Thus the mathematician regards things only under the aspect of extension in space, and determines the laws of form and number to which extended things are subject. The geologist deals only with the composition and arrangement of the rocks, and the remains of primitive ages embedded in them, and reads in them the early history of the earth and of life on earth. The astronomer deals only with the masses and motions of the heavenly bodies, and tries to read in them the origin and history of the cosmical system itself. The physicist in the narrower sense deals with the phenomena of light, heat and electricity. Thus the different sciences deals with the different departments of nature by themselves, and are thereby distinguished from philosophy which aims at co-ordinating the collective results of the sciences into a conception of the world as a whole.

And not on
the system
of the world
as a whole ;

And there is now a tendency, it may be added, (6) to restrict the term science to experimental investigations, or those which deal with concrete things and proceed by what is called the *inductive method*, that is, by direct observation of things (aided by analysis and, where possible, by experiment), and inductive inference from the particular facts observed to general conclusions capable of being verified by future observation.

And by its
resting
mainly on
experimental
and inductive
reasoning ;

And at the same time, (7), it is generally assumed (as a consequence of the above characteristics) that science deals with things only as *phenomena* and not as *substances* ; that is with the outward appearances which things present to the senses, and not with the things as they are absolutely in themselves—the inquiry into things as they really are being left to metaphysic (as that stage of philosophy at which it seeks to explain all the branches of nature as products of one ultimate principle, and therefore factors of one organic whole).

And in
claiming to
be true only
of things as
phenomena

II. *Next as to the term mind*—it is used with three spheres of connotation which must be distinguished at the outset.—

Mind again
is used with
three conno-
tations ;

(a) In the first place, it is used as a collective term for that class of states and activities which are distinguished from others by their attribute of being performed *consciously* ; that is, for the states and processes of feeling, thinking and willing,

(a) As a
collective
term for the
aggregate of

conscious states, *viz.*, the processes of feeling, thinking and willing, *i.e.*, the aggregate of mental phenomena,

in all their different forms, such as tasting, seeing, touching, perceiving, remembering, reasoning, desiring, deliberating, and so on. These are distinguished by this attribute of being performed consciously, from those other states and activities which we believe to be unconscious, and to go on of themselves independently of all consciousness—such as the flowing of the river, the turning of the wheel, the explosion of the mine. We call the conscious series *mental phenomena*, and may speak of them collectively as constituting mind; and the non-conscious series we call *physical phenomena*, and speak of them collectively as constituting physical nature, or the external world.

Which is the empirical conception of mind;

This, then, is one possible use of the word mind, *viz.*, as a collective term for the states and processes of feeling, thinking and willing, which constitute the stream of 'consciousness,' and are called mental phenomena. This is sometimes called the empirical conception of mind, because only the conscious states and processes can be said to enter into *experience*. Also the scientific conception, because it is only the states and processes that can be experimented on.

(b) As a term for the something which has these states, and performs these activities—*viz.*, that which feels, thinks and wills,

(b) But this meaning evidently does not exhaust all that may be meant by mind. We cannot think of states and activities without thinking of something of which they are the states and activities—we cannot think of feeling, knowing and willing without thinking of something that feels, knows and wills, and gives to these processes their unity and connection as functions of one reality. We cannot think of appearances (phenomena) without thinking of what *appears* in them. In other words, we cannot avoid thinking of a *substance* or *entity* underlying, supporting and manifesting itself in the states and processes of consciousness, apart from which the states and processes themselves are but empty abstractions. Hence the word *mind* may be used also to denote this mental reality, substance, or entity, which underlies and manifests itself in the mental phenomena of thinking, feeling and willing, and which, being itself one, gives them the connection and unity of a single mind.

Which is the metaphysical conception of mind;

In this sense, *viz.*, as mental substance, it is sometimes spoken of as *soul*. This is called the *metaphysical* conception of mind, because the *substance* of things is said to be known only by abstract reasoning, and not directly by experience in the sense in which phenomena are known. Mental substance is sometimes said to be a *noumenon* only, or something merely

which things it knows, and which it does not know. It knows phenomena, cannot be itself a phenomenon. It thinks other things; it must be aware of itself as something which thinks, that is, as reality.

(c) It can be seen, however, that each of the above senses of the word mind is one-sided and incomplete when taken by itself. The states and processes, or so-called phenomena, are nothing apart from the substance which supports them, and gives them their order and connection; and the substance is nothing apart from the states and processes in which it expresses and manifests itself, and realises its own nature. Taken by itself, each is but a logical abstraction without any reality of its own. They are only two aspects of the same thing; and the real concrete thing is the unity constituted by the two in correlation.

Hence the most adequate use of the word mind will be for the one concrete reality which is made up of the processes of thinking, feeling and willing (the *phenomena*) and the something which thinks, feels and wills (the *substance*), as correlative factors of the same being.

In short, we see that the word mind may be used in three senses—(i) for the mental states and processes of thinking, feeling and willing considered apart from their substance; (ii) for the entity which thinks, feels and wills considered apart from its states and activities—the soul or spirit; and (iii) for the concrete unity of both. These we may distinguish as the *empirical*, *metaphysical* and *philosophical* senses of the word.

* Thus, if the word psychology is to be taken in a wide sense to include mental study in all its different aspects, there will be several different kinds of psychology according to the aspect of mind studied. There will be *empirical psychology*, studying the outward manifestation of mind in the conscious processes of feeling, thinking and willing with their organic adjuncts as defined above; there will be *metaphysical psychology*, seeking to determine the nature of the substantial reality on which manifests itself in these processes and functions; and there will also be *philosophy of mind* combining the results of the above two, and striving to understand the human function and destiny of human mind as a factor of the evolution of the world. These have to be considered further in

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Hence different kinds of psychology.

Empirical

Metaphysical

Philosophical

How then does psychology differ from physical observation?

The question has been raised whether a science of mental states and processes

is possible in the same sense as of the states and processes of external things, because the difference between

(1) Observing external things

(2) And observing states and processes of mind, is so great

But is a mental science possible in the same sense as physical science? It appears, at first thought, as if there must be a fundamental difference of form and method between mental and natural science. Indeed the difference between mental and physical study has appeared so great to some, that they have doubted whether a fundamental science of mind or psychology based on self-observation, be possible at all in the same sense as physical science based on observation of external things. In order to compare the two forms of study we may

First, consider a case of physical study, and analyse the process involved. Suppose that the naturalist is studying a stone or a plant. There is here (a) on the one side the *mind* of the naturalist with its powers of seeing, touching, experimenting, comparing, reasoning, and (b) on the other side the *object* which he is studying. The object in this case is an object which fills a certain portion of space, and is therefore external to, and independent of the observing mind, and remains always ready to be observed whether any one is observing it or not. It is divisible into parts, and ultimately into molecules and atoms, each existing independently of the rest. All the changes which have to be observed in it consist fundamentally of movements, and all its properties are due to arrangements of parts, molecules and atoms in space, as produced by movements. It can be laid hold of, taken to pieces, measured, and otherwise experimented on. And it is open to observation by any number of different observers. But let us

Secondly suppose a case of mental study, such as the feeling of fear, or the activity of deliberating, and let us analyse the process. Here again we have (a) the same observing *mind* with its processes of feeling, perceiving, analysing and thinking as before. But (b) what in this case is the *object* observed and studied? The object in this case is the mind itself with these same processes of feeling, perceiving, remembering, reasoning, which are exercised in studying things. Thus, while in natural science mind, with its powers of observing and thinking, studies objects existing external to and independent of itself, in mental science it has to study its own self with its own states and processes. In other words, while

it is engaged in feeling, thinking and willing, it has to turn round upon itself, and observe itself and its processes of feeling, thinking and willing—to observe itself observing, as if it could double itself, or divide itself into two selves, in order that the one self might observe what the other self is doing. Thus, while in physical study the object studied is presented to the observing mind from without, in mental study the same mind is both the subject which studies and the object which is studied

And further, we must consider the nature of the states and processes (the *phenomena*) which have here to be studied, viz., those of mind. They are not processes of anything that fills and resists movement through space, and therefore do not consist in movements nor re-arrangements of constituent parts in space. They cannot be distinctly separated from one another and observed at different times, but are rather mixed up together in one complex process. They cannot be directly weighed, nor measured, nor experimented on, like external things, and do not wait upon the convenience of the observer, but rather vanish away or change in the very state of being observed. For when we try to observe a mental state, the activity which constituted the state seems to change into the activity of observing, and the state to be observed ceases to exist. And, even if mental states could be observed, it could not be by any other mind than that which experiences them

Hence the very possibility of observing an object, some have thought, depends on the object's having independent existence, and being presented to the observing mind as something composed of parts, existing outside of the mind and of one another in space. Hence mind can turn its thinking activity outwards upon other things, and can construct sciences of the earth and stars, of minerals and of plant and animal forms, but how it has been asked, can it turn its observing activity, inwards upon itself, and construct a science of its own states and activities?

These are the arguments that have been used to show the impossibility of a mental science in the strict sense of the word science. Nevertheless we find on closer consideration that this antithesis of subjective and objective study is more apparent than

And of observing mental processes?

How does the mental differ from the physical?

The difference has indeed led some to think that self observation in any scientific sense is impossible,

But we can show that this difficulty is based on misunderstanding,

real." For we find that this power of turning back upon itself, and observing its own acts and states (this power of reflection or self-consciousness), however mysterious it may be, is the very essence and differentiating characteristic of mind—that which distinguishes it from all other forms of activity—and that it is exercised in all forms of observation, physical as much as mental. We assume, indeed, that physical things are external to mind, and present themselves to it from without. Still they can make themselves known only by giving rise to particular states of mind, and can be known only through, and in terms of these mental states. In other words, we cannot become aware of the things and their qualities except by being conscious primarily of ourselves, and the states of ourselves to which the things give rise. What, for example, are we directly conscious of when we look at a tree? Of ourselves as experiencing certain sensations of light, shade and colour, of a feeling that these sensations are imposed upon us by something not ourselves, and a process of thought (more or less abridged and implicit) by which we interpret these experiences as implying a material object existing in space at a certain distance from us. In other words, it is only by observing and interpreting states and processes of self that we can know what is outside of self; and external observation, as practised in natural science, contains within it the same reflection or self-observation which has to be practised in mental science; and if the one were impossible, the other would be impossible also.

For the power of turning back upon and observing its own states and processes is the essence of mind, and present in all mental work.

Even external observation itself is possible only through the medium of self-observation :

And indeed all observation is in the first instance self-observation;

The difference is chiefly this: The knowing self can know the physical world only through being aware first of its own states and processes. But in mental science it stops short with the means, *viz.*, the mental states and processes themselves, without proceeding to their possible result—the knowledge of objective things. In natural science it takes for granted and passes over the means, *viz.*, the mental states, and goes on to the result, *viz.*, the knowledge of physical things beyond them.

And further, external things are known through the medium of sensations; and the presence of the things gives to sensations a degree of fixity and steadiness which does not pertain to other mental states, and thereby makes them to be observed more easily, and thereby the external things revealed in them. This greater fixity of sensations makes us think that there is

an essential difference between external and internal observation.

Indeed the difference between mental and physical observation may be stated in this way. In both cases the observing self and the thing observed, whether external thing or idea, are present in consciousness. In internal observation attention is turned mainly on the object observed, and the consciousness of self and its activity is allowed to sink into a vague condition of awareness. In psychological observation, the attention of self is reserved mainly for its own activity, by which it knows and understands the external object, and the latter is allowed to sink into obscurity. The two processes differ therefore only in the direction of attention.

Hence, instead of its being true, as some have too hastily assumed, that "mind can observe everything *except itself*, and all phenomena *except its own*," it would be nearer the truth to say that it can observe nothing but itself and its own states and activities, in this sense, at least, that it is only through the latter that it can reach the former or by *self-knowing* that it can reach *other-knowledge*.

These questions, however, of the nature and extend of knowledge lead us to the distinction between phenomena and reality, and between the science of mind and the metaphysic of mind, and between science and philosophy, which have next to be considered.

Self observation being primary—
other observation only secondary.

II

PHILOSOPHY.

§ 4

Modern science distinguishes between phenomenon and substance, and restricts itself to phenomena

It is usual at the present day to say that science deals with *phenomena* only, and keeps clear of metaphysic, and to speak of mechanical, chemical, electrical, vital, and even of mental, and social *phenomena*, as being the provinces of the physical, biological and mental sciences. Yet *phenomenon* is one of those words that we use too often without any precise definition, and therefore lead to much confusion of thought, and as the current distinction between the sciences and the metaphysic of mind and matter depends on the sense attached to this word, it is necessary to consider its import more fully. What does it really mean?

Phenomenon means the form in which things appear or manifest themselves

The word means literally something which is shown, made to appear (pass pet), or manifested, but is used for the *appearances* or *manifestations* themselves of things—the forms under which they *appear*, *reveal* or *manifest* themselves, considered as something different from the things themselves. It implies therefore a distinction between what things really are in themselves as realities or substances, and the forms under which they manifest themselves to other things. How then, can things be said to manifest their existence and properties to other things? Evidently, by producing *effects* or *changes* in them.

Substance, means the things as they are in themselves apart from their appearances

Thus the falling of bodies, the turning of the compass, the rising of the tide, are effects or manifestations of some reality exercising attractive power, the lightning-flash, and the shattering of the tree reveal the existence of something putting forth force in the form called electrical, the selection and assimilation of nutritive materials reveal the presence of life; the building of houses, making of machines, and writing of books are outward evidences of mind. Such things, therefore, may be said to be *phenomena*, or manifestations revealing the presence and

operation of which are apparently substantial realities, physical and mental, being really effects which these realities produce by their various modes of operation, magnetic, electrical, vital, mental.

But, even within the limits of this general meaning, the word *phenomenon* may be used with a wider and a narrower range of application :—

(a) It may be used with an *objective* application, that is, things may be said to manifest themselves by the effects which they produce in other things external to, and independent of mind. Thus it may be used for the changes which things produce in material things, and the world may be said to be an aggregate consisting of substantial realities, and the phenomena or changes which these realities, are constantly producing in one another by their reciprocal action and reaction—individually of any perceiving mind, and whether perceived or not (the adjective *objective* being used to connote the quality of any particular mind) Thus science, in dealing with astronomical, chemical and vital phenomena thinks of them as processes going on objectively, whether there is any mind to perceive them or not. And this is the sense in which the word is always used in natural science.

(b) It may be used with a *Subjective* application, that is, things may be said to manifest themselves by the effects which they occasion in conscious minds. Indeed, though often used loosely for all kinds of changes, yet appearance or manifestation has no strict meaning as such except to a mind that is conscious of it as such. For, strictly speaking, a thing can *appear* or *manifest* itself only to a mind that can be conscious of the manifestation, and understand what it manifests. Correctly, therefore, the term *phenomenon* is applicable only to those effects or changes which things occasion in perceiving minds. Thus, all phenomena are in the first instance really mental. But these mental changes come to be understood as corresponding to changes in extra-mental things. Hence, by analogy, the word has been extended to these latter, making the word to be used in the above objective case.

Now the mental states which we feel to be caused or occasioned in us by external things, are those which we call *sensations*. These we feel to be forced upon us from without whether we are willing or not. In them, therefore, we have manifested to ourselves the operation of something other than ourselves. The sun melts snow, dispels clouds, and makes sap circulate in plants; and these effects are often called phenomena in the above objective sense, but in our consciousness it excites sensations of heat and light, and it is in these subjective effects that its existence and qualities are directly revealed to us. The sensations of flash and sound manifest the occurrence of an electric discharge; a particular smell and colour, the presence

But things manifest themselves in two ways, whence *phenomenon* is used in two senses.

(a) Loosely for the effects or changes which things produce on other things in the material world

(b) More or less strictly for the conscious effects or changes things occasion in perceiving minds.

Indeed the latter is the proper meaning of phenomena

And the effects which things occasion in minds are sensations.

of a flower; the visible outlines in the rock, the presence of a plant or animal organism at the time when the materials of the rock were deposited at the bottom of a lake. Thus we come to understand such mental states as phenomena, or manifestations of extra-mental things.

Therefore to us the phenomena which manifest the external world are our own sensations,

For it is through them that other things manifest themselves to our minds,

And it is by interpreting, so to speak, the sensations which things occasion in us, that we come to know that there are other things besides ourselves, and to understand their qualities and relations, because it is only in sensations, that they can be said to appear or manifest themselves to conscious experience. To a thinking being, therefore, the real phenomena of the external world are his own sensations. Hence, when it is said that science deals only with phenomena, this should be understood to mean that it deals with things only in so far as they do or may manifest themselves in sensations, and can be represented in terms of actual and possible sensations.

Hence if it be true that science deals only with phenomena, it follows that, to science, a thing will be merely, as Mill says, "a permanent possibility of sensations," that is, an aggregate or cluster of sensations, which any and every mind may experience under certain conditions. These subjective effects, then, will be the phenomena of objective things in the correct sense of the word.

§ 5

The distinction between phenomena and substance explains the distinction between science, metaphysic and philosophy,

Now this explanation of the term phenomena enables us to understand the distinction commonly drawn between science and metaphysic. For it is clear that a thing may be thought of under either of two aspects.—(a) We may think of it as it manifests itself to us in our sense-experience, and is represented by us in terms of our sensations and of the ideas in which sense-experiences are retained and reproduced in other words, we may think of it as *phenomenon* merely. (b) But we cannot believe that the thing is nothing more than a possible aggregate of sensations or ideas within our own consciousness; we believe that it exists outside and independent of our own and of every individual mind, and that it is something that occasions these sensations in our own minds, and in all other minds with which it comes into relation. This is what we mean by saying that the thing has *real* or *substantial* existence.

Hence it follows that things may be thought of under two aspects, or from two points of view. A thing may be thought in terms of its *phenomena*, or the outward manifestation which it makes of itself to thinking minds; and it may be thought as the *reality* or *substance* which exists behind, and gives rise to the phenomena. The study of things from the former point of view gives the *sciences*, from the latter point of view, *metaphysic*. But these imply a third form of study which will combine the results of both these into one connected system and this is *philosophy*. Thus the above distinction enables us to understand the spheres of *science*, *metaphysic* and *philosophy*. First, then,

(A) *As to Science*, as distinguished from *metaphysic* and *philosophy*—From *metaphysic* the sciences are distinguished mainly thus. It is possible to investigate things as *phenomena* merely, that is as they manifest themselves to us by the *effects which they occasion in our conscious experience*. In other words, we may think of a thing in terms of the cluster of sensations which it gives us or has given, or would give, were we present to receive them—

Thus we may think of past distant and future things and events in terms of the conscious experiences (that is of the sensations) which they would have given, or will give to ourselves, or to other sensitive beings constituted like ourselves. The geologist thinks the ages before man existed on the earth, by imagining himself present, and picturing the great tree-ferns and pines, and the gigantic flying lizards and armoured sloths, as they would have appeared to his own eyes, had he been present. The historian describes past events as they appeared to the minds of those who took part in them, and as they would have appeared to himself if he had been present. The chemist thinks his atoms and molecules in terms of vision, touch, taste, smell, though he never really saw nor touched them—picturing them in his imagination as he thinks they would appear to his eyes if his vision were sufficiently acute to discern them, drawing diagrams of them, and perhaps comparing the atoms in a molecule to the planets composing the solar system, or the stars of a stellar cluster.

It is this way of thinking, then, that distinguishes science from *metaphysic*. This thinking of things in terms of

things as aggregates of possible phenomena, as sensations, or as the substances which produce the phenomena, or as the unity of both.

Now science proper thinks of things only as phenomena, i.e. only in terms of possible sensations, and is satisfied with determining what sensations they will give us

Whereas metaphysic seeks to determine the nature of things as the substances which produce sensations and other effects

Hence the distinction between

scientific and metaphysical knowledge,

phenomena; and conceiving how they would have appeared, or will appear to sense-experience, is *experiential* or *empirical* knowledge. And it is agreed that the sciences deal with things only in this sense—in other words, that they do not consider the question, what things may be in themselves apart from our sensations, but regard only the forms which they assume when represented in terms of our sense-experience; and are satisfied with determining how they will appear, or would have appeared, to the senses.

And superiority of scientific knowledge in being practical,

And the strength and importance of this *scientific* point of view, as distinguished from the metaphysical, consists in this: (1) that scientific knowledge is more or less *practical*, for what is of really practical importance to us with regard to things, is to know how they will *affect us*—whether beneficially or injuriously—when we come into relation with them; whereas metaphysic is more purely theoretical (except in so far as it can explain to us our relation to God, and our place, purpose and function in the world, in which case it is 'practical'); and (2) that the results of science are generally capable of being subsequently *verified* by new experiences, *i. e.*, by our coming into relation with the things, and receiving sensations from them. Hence empirical science may be said to be the *phenomenology* of nature and mind, that is, the study of things as they appear outwardly in their phenomena; as opposed to metaphysic, which is *ontology*, or the study of things as they are in themselves behind phenomena (of *onta*, things that really are), and is therefore a department of philosophy.

Though science is phenomenology only while metaphysic is ontology.

And further, science studies phenomena according to their separate departments;

From philosophy the sciences are distinguished not only in their avoiding metaphysic, but also in this that, instead of each dealing with the whole sphere of being as philosophy does, or even of phenomena, they deal severally with the separate departments of phenomena considered apart from one another. Hence they are distinguished according to the departments of phenomena with which they severally deal, and fall therefore into three main divisions, as already pointed out. Thus

Whereas philosophy studies the world-system as one whole of substances and phenomena.

(a) Some deal with the different departments of phenomena in which *inanimate matter* manifests itself to the senses, and are called the physical sciences—astronomy, mechanics, mineralogy, chemistry, etc.;

(b) Others deal with the different departments in which *life* manifests itself, and are called the biological sciences—botany, zoology, physiology, hygiene, etc.; and

(c) Others deal with the different departments in which mind manifests itself, and are called the mental sciences—psychology, ethics, logic, sociology, aesthetics, etc.

A science, therefore, may be said to be a body of general propositions bearing on some one of these departments; affirming that such and such phenomena always present themselves in such and such an order and connection, under such and such circumstances; and verified by observation, and, where possible, by experiment. But to science, the world is but "a permanent possibility of sensations"; and scientific knowledge consists in knowing, with greater or less certainty, what sensations have been, or might have been, or will be experienced by human beings under given circumstances.

Hence it follows, and is now generally admitted, that scientific knowledge is only relative, and only symbolical of reality, and not to be understood as literally representing what things really are in themselves, independent of our sensations. It is true to us in the sense that it tells us how things will affect our senses, but this kind of truth depends as much on the structure of our sense-organs as on the nature of things in themselves, and may not be true in the same sense to other beings differently constituted. "Physical science is not metaphysic. It has no intention of penetrating beyond our perceptions to grasp the essence and ultimate order of the objects of these perceptions. Its end is to construct by signs, borrowed from the sciences of numbers and geometry, a symbolical representation of what our senses reveal, thus clothing itself in a schematic garment which we call theoretical physics." "But we have been led to recognise that the formal and mathematical element is of our own introduction, that it is merely the apparatus by which we map out our knowledge, and has no more objective reality than the circles of latitude and longitude on the sun." Indeed we might go so far as to say that the phenomena of the world are to the reality which manifests itself in them, as the sounds of a speaker's words are to the ideas which they express. For phenomena reveal reality to the intelligent mind, and the mind can interpret and understand them as revealing reality, because it is itself reality; but they may have no more resemblance of kind to what they reveal, than articulated sounds or written figures have to ideas of the mind. The attempt to get beyond this phenomenal knowledge of things is metaphysic. Next, then,

Hence the admission of physicists that physical science gives only symbolical knowledge,

That we can think the world only in terms of our own sensations, and not as it really is

§ 6.

(B) *As to Metaphysic as distinguished from science.*—A little reflection may convince us that what is immediately present in our experience (in the case of physical things at least) is not the real things as they are in themselves, but

Metaphysic, on the contrary, seeks to penetrate beyond phenomena,

and understand what things must be in themselves independently of our sensations,

And consists in determining from phenomena what phenomena imply as to their own origin and meaning,

And is made necessary by the very nature of reason, to fill in what science leaves wanting to a complete conception of the world.

But differs from science in method,

only phenomena or manifestations of them (*viz.*, the sensations which they occasion in us). Yet we see that there must be real things existing independent of the sensations to which they give rise, and constituting a world of substantial realities, acting and reacting on one another, and going on all the same whether there are human beings present to be affected by them or not. This peculiarity of being independent of finite minds is expressed by saying that things exist *objectively* and *absolutely*, or as *things in themselves*.

Now, believing that the phenomena which enter into our experience are effects of realities having existence of their own independent of us and our experiences, we cannot avoid inquiring what phenomena themselves *reveal* or *imply* as to the realities which give rise to them—(for it is evident that we can know such things only through the medium of their manifestations). And the process and method of thinking by which we thus reason from phenomena to the objective realities which manifest themselves in phenomena and make them possible; and the effort to conceive these realities, mental and material, as they are in themselves, and to understand how they are related to the ultimate reality out of which they spring, and how they are thereby enabled to act and react on one another so as to produce phenomena,—is called *metaphysic*.

For phenomena by themselves leave our conception of the world incomplete, like a truncated cone, or arc of a circle. Reason, whose nature it is to strive after completeness and unity, is compelled by its own nature to fill in what is wanting. Until this is done, we feel that there is a vacant place, so to speak, in our minds, and feel an impulse to fill up the vacancy; in other words, we feel what has been called “the metaphysical craving of the soul.” And “by metaphysic we understand that form of knowledge which passes beyond the range of possible experience, beyond nature and given phenomena, to explain that by which everything is conditioned in some sense or other; or, more precisely, that which is behind nature and makes nature possible.”

But it differs from science not only in the kind of knowledge which it aims at, but also in its method. While science

proper proceeds by observation of things, and by experimenting upon them as they appear to the senses, and drawing inductions from observed facts to general laws—metaphysic proceeds by analysing ideas into their simplest contents, in order to discover what is implied in them regarding the objective realities which they are supposed to represent. It assumes that the thinking principle is itself reality, and that the essential forms and laws of its thought must have some correspondence ultimately to the forms and laws of real thing ; and seeks to penetrate from what is superficial and contingent in consciousness to what is essential and necessary, and is therefore presumably grounded in the nature of things. Thus, from what is necessary to thought, it seeks to determine what is necessary to reality.

Thus, experiential science assumes without explanation such ideas as substance, matter, space, soul, force, cause, time, action and reaction, infinity and the like ; and psychology as science seeks to explain how such ideas arise in the course of our experience. But we cannot avoid going beyond this, and inquiring whether, and in what sense, these ideas of our mind correspond to realities existing outside and independent of our minds ; and how these realities can be supposed, by their activities and interactions, to give rise to the world of finite minds and things and their phenomena as they enter into experience. And such inquiries into what is above experience and how experience is produced, evidently suppose methods different from inquiries into the contents of experience itself, and are therefore set aside for a separate investigation. Thus metaphysic may be said to be *ontology* or study of real things (*onta*), whereas empirical science is *phenomenology*, or study of outward manifestations (*phenomena*).

And this kind of inquiry must centre largely, it is evident round the two most fundamental of all the ideas which lie at the root of experience—viz., *substantiality*, or the question what the real existence of things must be conceived to consist in, and *causality*, or the question how real things must be conceived to depend on, and react on one another, so as to form a universe, or connected system of things. And the results thus arrived at will lead deductively to conclusions as to what mind and matter are in themselves considered as substance ; and as to how they are connected together so as to act and react on each other causally in the living body ; and as to the absolute reality

working not by experiment and induction, but by analysis and deduction ;

And aims at explaining ideas which science assumes without explanation.

Especially such fundamental ideas as substance and cause, which underlie all thought,

And lead to questions of soul, and

body, matter, God.

Its name, derived fortuitously from a treatise of Aristotle.

Called also theory of knowledge, but aims at the object known rather than the process of knowing.

And is therefore ontology, rather than epistemology.

It is opposed to scepticism, which limits knowledge to sensations,

from which both mind and matter derive their origin, or that which philosophy calls the absolute, and religion calls God. Thus the results of metaphysical investigation will centre round the highest forms of reality out of which phenomena spring, namely soul, matter, God.

Questions of this kind were called by Aristotle and Bacon, *primary* or fundamental philosophy—"the study of the first principles and first causes of things." Aristotle's treatise on primary philosophy was afterwards arranged by his editors, in the body of his collected works, after the treatise on the physical, *i.e.*, natural sciences, and hence came afterwards to be called 'the *metaphysics*,' *i.e.*, what comes after the treatises on nature. The term thus casually applied to Aristotle's treatise became at last a name for the class of subjects dealt with in that treatise. And it is appropriate in this sense: that a word which originally meant 'what comes after the natural,' may be applied also to mean what lies behind the experiential or phenomenal world and gives rise to it.

Another name often applied to this kind of investigation, and even to philosophy as a whole, is "theory or science of knowledge," or "science of principles." This is too narrow for philosophy, but may be so understood as to express the nature of metaphysic. For we cannot be sure that we know what things in themselves are, *e. g.*, such things as *substance*, *causality*, *soul*, *matter*, without knowing *how we know* what they are; and we cannot know how we know, without knowing at the same time *what it is* that we know, and *how far* we know it. Thus metaphysic may be described as the analysis and criticism of the fundamental ideas and principles involved in all knowledge, with a view to clear away whatever contradictions may be involved in them as commonly understood, and determine what is necessarily implied in them as to realities beyond. It seeks to determine *what mind must be in order to know nature, and what nature must be in order that it may be known by mind*. Two constituents of it are sometimes distinguished—*epistemology*, or theory of knowing, determining the conditions and factors necessarily involved in the knowing of reality; and *ontology*, or theory of realities, determining what is necessarily implied in knowledge as to the realities known, *e. g.*, to soul, matter, God.

There are some thinkers, however, called *sceptics* and *positivists*, who deny the possibility of metaphysical knowledge, at least in the sense of ontology; and maintain that positive knowledge is possible only within the sphere of phenomena or experience, to which accordingly all thought should be restricted.

ed, abandoning all attempt to understand soul, matter or God. But this (i) is equivalent to limiting thought, as Hume and Mill have shown, to the sphere of possible sensations and clusters of sensations. And (ii) this limitation, again, leads always to this result, that sensations and clusters of sensations are themselves identified with reality; which is evidently the fallacy of substantialising abstractions—dealing with the states and changes which things occasion in consciousness as if these states were themselves concrete things. And again, (iii), the rejection of metaphysical inquiry seems to be always accompanied by some misunderstanding of its meaning and method. It is after, all, only the effort to *think correctly* about matters regarding which no one can help thinking in some way or another. And the metaphysical question of the meaning and truth of experience is so involved in experience itself, and in the nature of reason, that the attempt to exclude it always defeats itself; so that the 'metaphysical craving,' though excluded for a time, always forces itself back more imperiously than before.

Several forms and phases of scepticism may be distinguished in passing:—

(1) Scepticism as to the possibility of ontological certitude merely, while admitting certitude within the sphere of positive experience and induction, i.e., admitting scientific certitude—as in the *phenomenalism* of Kant, and *positivism* of Comte.

(2) Scepticism as to the possibility of certitude even within the sphere of positive experience, i.e., even of scientific certitude; which, again, may be founded both (i) on *logical* grounds—as that all proof must rest on first premises which are themselves incapable of proof, and therefore, it is assumed, uncertain; and on (ii) *psychological* ground—as that the appearances of things to sentient beings depend not so much on the nature of the things themselves, as on the organic and mental constitution of the beings who perceive them, so that things must appear different to different beings, and universal truth is impossible—the scepticism of Protagoras and Hume (see Relativity). Finally.

And identifies sensations with realities,

And takes two forms:

(1) Positivism or semi-scepticism, denying the possibility merely of metaphysic, in the sense of ontology;

(2) And complete scepticism, denying the certainty of all knowledge, even scientific.

§ 7.

(C) *As to Philosophy* as distinguished from *science*.—The above division of the province of knowledge into two spheres—viz., that of the sciences which deal with phenomena, and that of metaphysic which deals with realities—seems to necessitate another form of investigation which will unite the highest results of the sciences and of metaphysic into one systematic whole of knowledge. This is the function of *philosophy*, which, by combining experience and metaphysic,

Finally, philosophy combines the results of all the sciences and of metaphysic, and seeks an understanding of the world as a whole.

aims at an understanding of the world of phenomena and substance, nature and mind, as one organic whole.

Various definitions have been given ;

Different definitions are given of philosophy, *e. g.*, that it is "science of knowledge," that is, inquiry into the way, in which our conception of the world is attained ; "science of principles," that is, inquiry into the origin and import of the fundamental ideas and propositions (axioms) upon which our knowledge of the world is based ; "science of the absolute," that is, of the ultimate and self-existence reality and power which manifests itself in the world ; "the ultimate unification of the highest results of experience," that is, the drawing and combining of the results of the experiential sciences so as to arrive at a conception of the world of experience as a whole.

But all may be included under one definition.

Hence the definition which expresses its meaning best, and includes all the rest, is that philosophy is the sustained effort to attain to a conception of the world of mind and nature as a whole, which will be free from contradictions within itself, and will agree with, and help us to understand better, the world of experience, and our own position, duty and destiny as factors of the world. In this sense, is certainly corresponds to an essential want and natural craving of the mind, for it is the very nature of understanding to strive after order, connection, meaning and unity everywhere ; and until this is attained, there is a feeling of incompleteness and insufficiency, and consequent perplexity and unrest. Hence it seems to be necessary for the mind to rest upon some ultimate hypothesis regarding the world as a whole, and its own relation to it, that is a philosophy, (or a religion in which a philosophy or theory of the world is implicitly contained).

It rises out of an essential demand of understanding, *viz.*, for unity and order ;

And is universal in some form or other,

And it may be safely said that every thinking being has a philosophy of some kind, however crude ; and that the object of philosophical study is not so much to provide us with a conception of the world, as to correct what conception we already have ; to clear away the contradictions involved in all popular conceptions ; and introduce the new ideas and new points of view which are always opening up with the advance of scientific knowledge, and more accurate methods of metaphysical thought.

Striving to attain an understanding

Hence, in its higher and more carefully reasoned forms, philosophy proceeds by drawing the highest results of the

experiential sciences, and reconciling and combining them with the best results of metaphysical reflection; and seeking to rise thereby to an adequate notion of an *ultimate* substantial reality, from which it may explain the world of finite things and minds and their phenomena deductively; that is, by showing how they follow as products from the operation of the ultimate power, and form with it one organic, intelligible world-whole.

And hence, in method, while the sciences are mainly *analytical* and *inductive*, dissecting nature, so to speak, into its constituent elements, as the anatomist does the body, and generalizing from particular facts to general truth—philosophy will be both *inductive*, (*viz.*, in so far as it starts from, and draws the results of the various sciences), and *deductive*, (*viz.*, in so far as it seeks to understand how the parts and their working follow from the plan and purpose of the whole, as the organs and their working result from the life of the organism).

The relation between the sciences and philosophy, however, is a subject of frequent discussion. The sciences without philosophy, it may be said, are an aggregate of units without organic unity, like body without soul; while philosophy without the sciences, would be like soul without body. More precisely, the sciences seek to determine what the phenomena or manifestations of the world in their various departments are, or would be, to the conscious experience of beings constituted like ourselves (phenomenology); while philosophy, (aided by metaphysic) seeks to explain what phenomena mean, and to make phenomena intelligible to the understanding by showing how they arise as factors of one connected world-system, by the productive energy of one absolute world-power. The sciences seek to determine the contents of the world as they appear to the senses; philosophy, to understand the fundamental force or life which evolves, and gives connection and unity, to these contents.

of the world
as a whole,

And combin-
ing deductive
with induct-
ive methods,

And there-
fore, in its
highest form,
using meta-
physic to
penetrate
beyond
phenomena
to their
grounds and
causes.

Science with-
out philoso-
phy is a loose
plurality
without any
unifying
bond—philoso-
phy with-
out science,
a system of
abstractions,

§ 8.

But from the distinction which has been made with regard to the two aspects of things—phenomenal and metaphysical, things as they *appear*, and things as they *are*—it follows that there will be two forms, or at least two stages, of philosophical inquiry; and indeed, throughout its whole history philosophy has been divided into two schools on the basis of that distinction—an *experiential* or *empirical school*

But there are
two forms or
stages of
philosophy,

Experiential
and rational.

founded on positive science, and limiting the world-whole with which philosophy deals to the whole series of phenomena or possible experiences, and a *rational school*, seeking, by means of metaphysical reasoning, to penetrate beyond the phenomena of experience to the reality underlying them, and to understand how phenomena arise, and thereby comprehend the world as a *real* whole of substance and phenomena. Hence there will be an

Thus it may consider only the world of phenomena as a whole, limiting itself to their order past and future,

Considering merely how the world would appear to the sense-experience of a spectator like ourselves;

(1) *Empirical Philosophy*.—It may be thought possible to construct a conception of the world wholly in terms of phenomena, or of "experience" alone; which is equivalent to saying, a conception of the world as it would manifest itself to the sense-experience of a spectator constituted like ourselves, but present to it throughout its whole extent and history. Such a universal observer may be supposed to receive the sensations which the processes of the world would give him, and retain them in the form of ideas, in the order and connection in which he experienced them. He would thus obtain a connected system of ideas corresponding to his experiences of the world, without making any attempt to go beyond his sensations and understand what is implied in them, (thus avoiding metaphysic). Such a spectator would have a complete experiential knowledge of the whole world, such as the positive sciences give of particular departments. Now empirical philosophy starts from the knowledge of actual experiences supplied by history and the sciences: and draws conclusions from what has actually been experienced, to what would or might have been experienced by such a universal spectator; and tries to picture the whole world-process in its entirety, as it would appear to him. This, then, is equivalent to conceiving the world in terms of experience or phenomena, that is, simply in terms of possible sensations and feelings. And the effort to attain to such a conception is philosophy in the sense to which it is limited by the sceptics Hume and Mill, and the positivists Comte and Spencer.

Which is best exemplified in the philosophy of

The most complete attempt at a *theory of the world* (or at least of that portion with which we are directly connected, *viz.*, our own solar system) on purely empirical lines, is seen in Herbert Spencer's "Synthetic Philosophy"; which begins

Spencer—tracing the evolution of

(i) In *First Principles* and *Essays* with assuming the existence and laws of matter, space, motion, and conser-

vation of energy as they appear to experience, and are assumed in physical science ; and rising from these to an explanation of the origin of the solar system ; concluding from the laws of matter and motion, and from the analogy of the nebulae or clouds of star-dust seen in the outer regions of the sky, that the matter of which sun, earth, planets and moons are composed was at one time diffused through space as a nebula of star-dust, and was condensed into rotating globes by the physical forces inherent in it, operating according to known laws of mechanics ; and then

the world as it would appear to the senses,

From nebula to material cosmos,

(ii) In *Principles of Biology*, endeavours to show how, on the newly solidified and gradually cooling globe of inanimate matter, living organisms made their appearance in their most elementary forms, consisting of minute globules of protoplasm ; and how, in the course of ages, they developed by continuous differentiation and integration of organs and functions, through innumerable intermediate forms, into the species of plants and animals which now cover the earth ; and next

From matter to life,

(iii) In *Principles of Psychology*, tries to explain how mind, from the elementary feelings of want and satisfaction, pain and pleasure, which may be supposed to exist in the lowest animal organisms, develops through all intermediate stages of complexity, until at last the human mind emerges ; and how the individual human mind, from its rudimentary stage in the infant, develops into the complicate system of feelings, ideas, and volitions which constitutes the mature mind ; and finally

From life to individual minds,

(iv) In *Principles of Sociology and Ethics*, shows how individual minds, in their struggle for existence, necessarily joined themselves together into societies for mutual help and defence, and thereby developed manners and customs, moral laws and habits, forms of government and religion, and arts and sciences,—thus rising gradually from the lowest forms of society such as still prevail among savages to those prevailing among civilised people at the present day

From individual minds to societies ;

And this philosophy of Spence claims to be purely empirical, that is, to describe the origin and history of the world simply as they would have impressed themselves on the experience of a spectator like ourselves, and to describe the order and connection of events (viewed as phenomena merely) in time and space, without committing itself to any conclusion as to the ground, reason, or ultimate cause out of which they spring. We can know, indeed, that behind the world of finite things and forces there is an infinite energy of which they are the products. But this energy must remain to us unknown and unknowable, because experience gives only its products, *viz.*, phenomena, and not the thing itself which produces them.

But without any attempt to understand to ultimate ground of all,

It is easy to see, however, that this purely empirical method fails to attain that unity at which philosophy aims. There are at least two gaps in the ascending scale of evolution

And failing therefore to satisfy the demand of

reason for consistency and unity.

which it cannot bridge over. It cannot explain how the mechanical processes of physical nature came to be supplemented by life ; nor how life came to be supplemented by self-consciousness. In other words, it leaves impassable gulfs between mechanism and life, and between life and mind. It fails therefore to attain the purpose of a philosophy. But philosophy may combine experience with metaphysic. Thus

§ 9.

Or it may supplement experience-philosophy with metaphysical reasoning.

(2) *Rational Philosophy* includes indeed the study of mental and natural phenomena as they appear in experience, and draws the highest results that can be drawn from the special sciences (*i. e.*, it includes empirical philosophy within it) ; but, instead of stopping with phenomena, it proceeds on the principle that, as phenomena are manifestations of realities beyond themselves, the nature of the realities can be understood from the phenomena in which they manifest themselves ; and seeks therefore to rise from phenomena to substance ; and to explain the world of experience itself by showing how, from absolute reality or substance as ground, the world of nature and finite minds with their phenomena arise as consequences.

And seek to understand the world of substance and phenomena as a whole,

In other words, it denies that phenomena can be abstracted from reality, and studied and understood by themselves as if mere phenomena were things by themselves ; and maintains that reality is present in and revealed in its phenomena ; and that reason cannot think and understand even phenomena without thinking and understanding the realities manifested in them ; and that therefore even experiential knowledge must assume metaphysical results, whether acknowledged or not. It therefore subjects experience to metaphysical analysis, to determine what is really implied in it as to the realities out of which it springs, and to reach back to the one ultimate reality out of which all phenomena of experience spring ; and seeks to explain both mind and matter and their phenomena, as factors in one connected whole, having its ground in one ultimate reality, which philosophy calls the absolute, and theology calls God.

By discovering and analysing the fundamental ideas underlying experience,

Thus rational thought finds the empirical method to be superficial and uncritical. Knowledge cannot be attained by a mere adding together of experiences, but by an interpreting and understanding of experiences, which requires a special

exercise of reason as a power different from mere experience of sensations. To have experiences is one thing ; to understand their meaning is another thing. Even the conception of the world which empirical philosophy believes to be derived wholly from experiences (impressed on mind from without like pictures in the camera) is not really such. It includes, indeed, materials received from without, but these have been supplemented by such notions as substance and attribute, cause and effect, infinite and finite, absolute and relative ; and these are not impressed on mind from without in the form of sense-experiences at all, but are evolved from within by the mind's own intellectual power as being necessary to the understanding of things, and read into sensations in order to give them meaning.

Now rational philosophy aims at giving a reasoned account of the way in which we thus interpret experiences, and thus make them the means of understanding the existence and attributes of the realities manifested in them, and thus form a conception of the world in which realities as well as phenomena will be taken into account. For philosophy aims at discovering the connection and unity underlying things ; and therefore the unifying power of the world cannot be found in its phenomena, but only in the reality which lies behind and produces the phenomena.

The two methods might therefore be compared to tunneling a mountain from opposite sides so as to make the tunnels meet. The empirical method begins on the side of sense-experience, and proceeds by inductive generalisation from particular facts to general laws of the world of experience. The rational method begins with the fundamental notions and necessities of reason, and seeks to determine from these the conditions without which the existence and connection of things—of soul, matter and God—would not be possible ; and to deduce from these conditions the nature and laws of the world of experience. The difficulty is to get the two sets of results thus arrived as to meet and coincide. The empiricist complains that the deductions of the rationalist (such as Hegel) do not tally with the facts of experience. The metaphysician complains that the generalisations of the empiricist (such as Spencer) do not satisfy the requirements of reason. The true philosophy will be a complete reconciliation of the two. Hence

Three departments of philosophy.—Thus philosophy, in the highest sense of the word, will draw, reconcile, and combine the highest results both of empirical investigation in

Determining
from these
the realities
implied in
them behind
experience,

And explain-
ing deduc-
tively from
these the
world of ex-
perience itself
—the pheno-
mena of mind
and matter.

It seeks
therefore to
reconcile and
combine the
results of
science and
metaphysic,

And will com-
prise three
branches,

the sense of Spencer, and of metaphysical, in the sense of Aristotle, and will seek to attain its end by the right use of both. And it follows that it will have three principal branches. Thus

Mind,

(i) *Philosophy of Mind* will avail itself of all that empirical psychology can teach as to the order and connection of mental phenomena ; and, with the help of metaphysical criticism, will trace them back to the reality or substantial ground implied in them, which we speak of as *soul* or *spirit*—seeking to understand the relation between that which knows, and that which is known ; or to determine what mind must be in order that it may be able to think and understand the world. This is sometimes called *rational psychology*.

Nature

(ii) *Philosophy of Nature* will avail itself of what the sciences teach as to the phenomena of external nature, and with the help of metaphysical analysis will trace them back to the substantial reality implied in them, which we speak of as *matter* ; and will seek to explain the relation of matter to mind ; or, in other words, to determine what matter must be in order that it may manifest itself to, and be known by mind. This is sometimes called *rational cosmology*. Finally

God,

(iii) *Philosophy of the Absolute or of God* will avail itself of the results of the above, and seek to trace back the worlds of mind and nature to the unity of a single ultimate reality, by showing how finite minds and things can be accounted for only as factors or products of the operation of one infinite and absolute power. If this could be accomplished then the world would really be understood as a whole, which is the aim of philosophy.

And is known
by different
names indi-
cating its
different
aspects—

Rational,

A priori,

This kind of philosophy, then, which supplements empirical by metaphysical investigation, and combines the results of the two into a connected system, is sometimes called *rational*, because, in going beyond the phenomena of experience, it has to trust to pure abstract reasoning like mathematics ; whereas empirical philosophy claims to rest more directly on the sciences of observation and experiment. It is also called *a priori* philosophy, because, in order to understand sensations from without, the understanding has to supply notions, and forms or laws of thought from within, which are therefore, in a sense, *prior*, or antecedent to experience ; (whereas, according to the empirical way of thinking, all elements of knowledge are, without exception, *a posteriori*, *i. e.*, derived

from, and therefore, *posterior* to experience). Also *transcendental*, because it aims at an understanding of realities which *transcend*, *i. e.*, lie above and beyond the series of actual and possible sensations which constitute experience as commonly understood. Also *speculative*, because it aims at a general and comprehensive view of the world system as a whole (from *speculari*, to take a comprehensive view, as from a distance). Of the attempts to work out a reasoned conception of the world as a whole, the most elaborate are of those of Aristotle, in ancient, and Hegel and Herbart in modern times.

Transcendental.

Speculative.

This leads us to consider more precisely the relation of psychology to science, metaphysic and philosophy as above defined.

III.

PSYCHOLOGY AND METAPHYSIC.

§ 10.

Psychology as science is limited to what can be observed and experimented

And therefore to the phenomena of mind, and is thereby separated from the metaphysic of mind.

Thus the distinction between psychology and the metaphysic of mind is founded on the distinction between substance and phenomena.

But is the separation between phenomena and reality applicable.

We have seen that the criteria which distinguish scientific knowledge from popular opinion include these conditions: that its truth shall be of general application, and shall be demonstrable, and verifiable in particular cases by observation or experiment. It follows that the term science can be applied strictly only to those branches of mental study which can be pursued and verified experientially. But metaphysical results regarding mind as substance (or soul), and its relation to the world system as a whole, appeal to the understanding solely and do not fall within the field of empirical observation. Hence metaphysical investigation, as being purely abstract and rational (like pure mathematics though without similar verifiable results), is now generally distinguished from science in the narrow sense, and relegated to theoretical philosophy. But the phenomena, or states and processes of mind and body as they appear in conscious experience, can be studied by observation and experiment, and therefore fall within the sphere of science proper.

Thus psychology as a science will be limited to the phenomenology of mind, or empirical study of the various manifestations of mind within the sphere of conscious experience, that is, its states, processes and products.

The distinction, therefore, between psychology as science of mind, and as metaphysic or ontology of mind, is based on the distinction, between phenomenon or manifestation and reality or substance, and the application of this distinction to mind.

Now this distinction as applied to the external world is, we have seen, an inevitable one. For when we reflect that the sensations in or through which we know external things are states of our own minds, we cannot avoid asking the

question, how far these states of our minds agree with, and represent things existing external to, and independent of our minds; and this is equivalent to distinguishing between the phenomena of the external world (which are the sensations it gives us) and the reality which occasions them (which is its substance)

But does this distinction between phenomenon and reality apply to mind itself as well as to matter? We can understand how mind knows matter through the medium of phenomena, but how can it be said to know itself also through phenomena? Are we justified in speaking of *mental phenomena*? Yes mind as well as matter may be said to manifest itself in and through its products. Indeed there are two ways in which mind may be said to manifest itself, and therefore two classes of what may be called *mental phenomena*. Thus

(1) Every mind manifests its own existence and its own thoughts, feelings and volitions *outwardly* to other minds, and these outward manifestations of mind to mind will be phenomena. How then does one mind manifest itself to other minds? By occasioning certain effects in its own organism and thereby also in the external world, such as looks, sounds, movements, works, which, again occasion effects (sensations) in other minds. These effects are interpreted by the minds which experience them, as coming directly indeed from the material world, but indirectly from a mental cause. Thus the cries of the animal, the looks and movements of the child, the voice and gestures of the speaker, the laws of Rome, the temples of ancient Egypt, the ancient books of the Hindus, are phenomena or manifestations of minds to other minds, through the medium of matter, and the sensations which it impresses from without.

Thus one way in which mind manifests itself is the production of changes in its own organism and in external things, these changes manifest themselves from the outside as material phenomena both to the mind which produces them and to other minds. These may be called *objective* mental phenomena, because in them mind manifests itself through the medium of the objective or external world, and supply materials for the objective study of mind.

(2) But every mind reveals itself to itself *inwardly in its own self-consciousness*, viz., in the states and acts of feeling, thinking and willing. Hence psychologists speak of the conscious states and processes of mind, such as feeling, perceiving, remembering, reasoning, fearing, loving, willing, and their conscious products—feelings, ideas, volitions and the like,—as *phenomena of mind*. But the definition which applies to

How can there be mental phenomena?

There are mental phenomena in two senses

Mind manifest itself to other minds by producing changes in the external world.

Which may be called objective phenomena of mind;

And it manifests itself to itself in feelings, thoughts and volitions,

other phenomena does not, it may be objected, apply to these. These are not effects occasioned in the mind by other things, but are states and activities arising from within the mind itself.

Yet there is a sense in which it is correct to speak of these also as phenomena. It is only in and through its processes of thinking, feeling, and willing that mind can become conscious of itself as mind. They are the materials of its own self-consciousness. These states and activities are therefore, in a sense, the mind's own *manifestations of itself to itself*. We may speak of them, therefore, as phenomena, if by that we mean, not effects occasioned in the mind by other things, but processes and activities in and through which mind reveals itself to itself, and becomes conscious of itself. And we may speak of these, the mind's manifestations of itself to itself, as the *subjective* or *internal* phenomena of mind, to distinguish them from the manifestations of other minds through material things. It is they that form the material of the *subjective* or *introspective* method of psychological study.

Which may be called subjective mental phenomena.

But sensations are phenomena in both senses

But there is this ambiguity to be guarded against: that one class of mental states will have to be regarded as phenomena in both the above senses. Sensations are conscious processes of mind, and are at the same time effects occasioned in the mind by, or through external things. They are, therefore, (1) external phenomena, in the sense that through them the *external* world manifests to us its existence and attributes; and (2) *internal* or *subjective* phenomena, in the sense that through them the mind becomes aware of itself, and its attributes of sensibility, thought, etc.

§ 11.

Hence a necessary distinction between psychology as science and psychology as metaphysic.

We can now understand the distinction between psychology as *science*, and psychology as *metaphysic* and philosophy of mind. For it follows from the distinction made between phenomena and substance as applied to mind, that mind like nature may be regarded from the points of view—that of the states and processes, and that of the substance out of which they spring. Approached from one side, it gives the *phenomenology* of mind, which is *scientific* or experimental psychology in its different branches; from the other side, the ontology or *metaphysical* study of mind, which belongs to philosophy rather than to science proper. Thus on the one side we have

A. The Phenomenology of mind

Psychology as science includes

Or *Empirical Psychology*, which is the study of the phenomena, that is, of the states, processes and products by which

mind manifests itself to itself and to other minds in the world of conscious experience—on the assumption that the manifestations can be studied and understood as such, apart from all question of the something which manifests itself in them, and by the same methods of observation and experiment as are applied in the natural sciences. The phenomenology of mind again will include

(I) *Analytical Psychology*, or the study of the states, processes and products of mind considered by themselves, and so far as they can be observed, analysed and understood apart from the corresponding processes of the organism in which they embody themselves. These will include (i) the conscious processes in which mind manifests itself *to itself inwardly*, *viz.*, thinking, feeling and willing in their many forms. And under the same head may be included also (ii) the *outward* products of these mental processes by which mind manifests itself to *other minds*, *e.g.*, speech, works, literature, politics, law, religion. For mental phenomena of the outward or *objective* kind such as looks, movements, speech, and works, by which one mind manifest itself to another externally, are of psychological import only as an index of the *internal* phenomena—the thoughts, feelings, volitions—of the mind which manifests itself in them.

Thus all mental phenomena resolve themselves ultimately into phenomena of the *internal* or subjective class, *i.e.*, into the conscious states and processes of feeling, thinking and willing as they appear to every one within the sphere of his own self consciousness.

Hence empirical or scientific psychology regards mind as merely the series or aggregate of actual and possible subjective phenomena or conscious states and processes of the sensations, perceptions, ideas, emotions, volitions which make up the conscious life of mind, and begins with the observation and analysis of these conscious states and processes of feeling, thinking and willing, with a view to resolve the complex ones into the more elementary ones of which they may be composed, and determine the conditions, and laws according to which these elements combine in compounds

(1) Analysis of the conscious processes and products of mind—its subjective and objective phenomena—to discover their composition, conditions and laws,

Regarding mind in the empirical sense, as identical with the series of processes and products, and nothing more,

and series, and co-operate so as to constitute one 'mental' life, and evolve the products called mental, such as knowledge, art, and the institutions of society.

And claiming that mental phenomena can be studied by the same method as natural, and that psychology can be treated as a natural science,

Employing the same methods,

And dealing with phenomena only, as natural science does;

Though there is evidently a difference between knowing mental, and knowing physical things;

For mental phenomena are known directly—physical things only indirectly.

And it assumes that mind can observe and analyse its own states and processes in the same way as it can those of the external world; and can understand the succession of changing states which make up its own conscious life, without having any theory or knowledge of what mind itself is as reality or substance. In other words, it deals only with the conscious processes of thinking, feeling and willing, and take no account of that which thinks, feels and wills—only with the phenomena, and not with the substance of mind.

This, then, is the sense in which psychology was studied by Locke, Hume, Hartley, James and J. S. Mill, Bain and Spencer. They claim for it that it is a "natural science," co-ordinate with the other natural sciences. For natural and mental science agree, they say, (i) in employing essentially the same methods of observation and experiment, the difference between them consisting only in the subject-matter with which they deal. For, while psychology deals with the states and processes of mind, with a view to analyse them into their elements and discover their laws and conditions, the natural sciences deal with the laws and processes of something assumed to exist external to, and dependent of mind—an extra-mental world. And they agree further, it is assumed, in this (ii) that both deal with these states and processes, mental and non-mental, merely as *phenomena*, and avoid all questions of the *realities* or *substances* which produce the phenomena, *viz.*, soul and matter,—in order that their results may remain unaffected whatever theory may be adopted regarding the substances and the origin of the phenomena.

Yet it is easy to see that psychology is not wholly on the same line and level with the natural sciences, as is so often assumed. Mind knows itself and its own states and activities directly in self-consciousness. It knows the external world only indirectly, and through the medium of its own states and activities. For the physical or extra-mental world can be known to mind only through the ways in which it affects mind, that is, through the sensations of touch, colour, etc., which it occasions, and the processes of perception and thought which these give rise to. In other words, the subject-matter of the natural sciences themselves can be known only in terms of sensation and idea, which are at the same time the subject-matter of mental science. And it is only by a process of thought that we can reach from these states and processes of our own minds to the states and processes of a world outside of our minds—the province of natural science. Thus it may be claimed that

12.1. PSYCHOLOGY AND METAPHYSIC

mental science is logically anterior to natural, and the latter in a sense dependent on to the former.

Considered from this point of view, analytical psychology may be said to occupy an intermediate position between philosophy and metaphysic on the one side, and the natural sciences on the other. Hence the tendency, in the older writers especially, to identify it with philosophy and metaphysic. But the phenomenology of mind will include also

§ 12

(II) *Physiological Psychology*, or the study of the organic processes of brain, nerves, sense-organs, and muscles, in which mental states and processes express and embody themselves, and through which mind itself is affected by processes of the external world, and by means of which mind produces those changes in the external world which manifest its own existence to other minds. For mind is found always in connection with an organism, and the series of states and processes called mental is found to be connected with another series of the kind called physical, *i.e.*, those of the organism, and these organic processes, again, either cause or are caused by processes of things and minds external to the organism. And it is through these physical organs that the individual mind knows the existence of the external world, and manifests its own existence to the rest of the world, and makes itself to be an active factor in the development and history of the world in which it lives. And hence the scientific study of the mental series will be incomplete without that of the physical series which runs parallel to it, *i.e.*, without the physiology of those organs and processes which are most directly connected with mental processes, and which form the medium of communication between the individual mind and the world beyond—chiefly those of brain, nerves, sense organs, and muscles.

(2) Study of the organic processes with which mental ones are connected,

Thus when I see a flash of lightning it is because the vibrations of the etherial medium enter my eye, and produce currents along the optic nerve, and processes in the visual region of the brain which give to sensation any thought. And when I will to do anything, the mental processes of thinking and willing gives rise to processes in the motor region of the brain, and these to currents along the outgoing nerves, and these to contractions of muscles and movements of feet and hands.

And through which mind communicates with the physical world, and with other minds

or mental states are always accompanied by bodily states.

This principle holds good of all the mental functions,

As of sensation,

Of thinking and feeling, including the emotions,

And further, it is through changes produced in the physical world that the individual mind comes to understand that there are other minds like itself. It finds that it can communicate with them, and they with it, through the medium of the physical world. But in so doing, it comes to understand also that there is one portion of this physical world with which its own existence is bound up more intimately than with the rest, *viz.*, its own organism. And it comes to understand that it is by first occasioning processes in its organism that it causes changes in the extra-organic world, and thereby also in other organisms, and through them communicates with other minds, and that it is through changes imposed upon its own organism that it becomes aware of changes in the physical world and in other minds.

This reciprocal dependence of mind and body may be expressed in the *principal of concomitance*—that for every mental process there is a corresponding process of the physical organism,—and may be illustrated under each of the three fundamental functions of mind, *viz.*, sensation, thinking, emotion and willing.

(i) Thus it is through the medium of the organism that the external world influences mind. It does so by exciting sensations in it, and sensations are produced in this way. A physical force acts on some part of the bodily organism specially adapted to receive that kind of influence, as impact of solids on the skin, waves of air and other on ear, and eye. This physical impulse from without is transmitted along special channels of communication to a centre in the brain, whence it is diffused through the whole brain and body. The physical excitation of brain and body thus caused by the external force gives rise to the mental state called *sensation*, and the sensations thus excited by external forces through the medium of organism supply the mind with the material from which, by exercise of its intellectual powers, it constructs its knowledge of the external world.

(ii) The materials thus supplied by sensations, therefore, set working the intellectual powers of thinking and reasoning by which we arrive at knowledge of things, and knowing gives rise to feelings of satisfaction, regret, fear, hope, wonder and the like. It might be supposed that these are purely mental, and have no connection with body. But on the contrary, it is known that even intellectual work such as remembering, imagining, reasoning involves an activity of brain, and an adjustment and co-operation of the muscles and other organs. And not only so but in the feelings to which thought gives rise such as anger, fear, hope, wonder, there is an overflow of force into, and molecular agitation of the whole physical system, varying with the kind and degree of the feeling. And the

rapidity of the thought and the degree of the feeling can, to some extent, be measured indirectly by measuring the accompanying organic processes.

(iii) And finally, it is through the medium of the organism that mind, incited by its feelings and guided by its thought, reacts upon, and occasions changes in the external world. For the mental processes of desiring and trying to do something, first give rise to a peculiar molecular agitation of the brain, which diffuses itself by nerves through the whole organism ; and in consequence of this, there is an adaptation of the whole organism to physical work, and a concentration and outflow of energy along special channels to contract special muscles and produce special movements and thereby changes in things, and thereby more agreeable sensations and feelings.

Of desiring,
conation and
willing.

Seeing, then, that it is through the processes of the organism that mind communicates with, and forms a constituent of the world, it follows that a science of the mental processes must be, to some extent, a science of the organic ones also in which the mental are involved, and that psychology must include an element of physiology also. And the study of the processes of body most closely correlated with mental states and operations is called *physiological psychology*.

Hence the
necessity of
physiological
psychology,

And this concomitance between mental and organic processes makes possible also the new form of psychological study called *psycho-physics*—the attempt to measure the degree and duration of mental states and processes by measuring the degree and duration of the organic ones in which they manifest themselves. This, if it can be done, will make psychology to be to some extent a quantitative science, subject to mathematical calculation. But there are

And psycho-
physics ;

Limits to physiological psychology.—The relation of psychology to *physiology* is complicated by this, that the organism, like all other material bodies, is itself known only through the medium of mental states. For the organism, as well as the extra-organic world, manifests itself to the mind only in and through the sensations which it gives rise to, and in considering the relation between mental and bodily processes, we have to assume beforehand the psychological process of perception, in which mind, by interpreting its own sensations, comes to know the existence and attributes of body. Therefore mind can know its own body only in terms of its own sensations and ideas, i.e., in terms of psychology. Hence physiological psycho-

Though
there is this
complication,
that the
facts of
physiology
themselves
can be
known only
through and
in terms of
mental states.

logy is open to the charge of paralogism in this respect, that it attempts to explain mental processes by means of sensations and ideas, which are themselves mental processes.

And the usefulness of physiology in its bearing on mental science has its limits in other respects, which are apt to be forgotten :

And the value of physiology is liable to be exaggerated ;

It cannot explain the essential nature of either mind or body,

For the principle of concomitance is only partially true ;

Describing a bodily process is not the same thing as explaining a mental one ;

And the bodily processes are really more obscure than the mental ones.

(a) Physiology cannot, any more than psychology (owing to the limits which they impose on themselves as merely empirical sciences of phenomena), settle the question of the ultimate relation between mind and body. To do that would suppose an understanding of how mind and matter are related in themselves as realities ; and that is a question of metaphysic not of experimental science.

Nevertheless they cannot work together without some provisional hypothesis as to the relation of the two kinds of phenomena with which they deal, and one which will be capable of at least approximate verification. This is thought to be supplied in the above *principle of concomitance*—that for every mental process there is a corresponding process of the physical organism. This is sufficiently established as far, at least, as concerns what may be called the "materials" of mental processes, i.e., sensations, representations, motions and movements. It can hardly be true, in the same sense, of the pure activity of thinking itself, that is, of discriminating, comparing, and understanding these materials. There is something everywhere in thought that is not in body. And again we cannot, convert the above proposition and say that, for every process of the organism, there is a corresponding process of mind—though it is probable that every organic process affects, remotely at least, the aggregate of consciousness.

(b) The mistake must be guarded against, of supposing that describing a physical process of organism, is equivalent to explaining the corresponding mental process. Though there is some correspondence between the two, yet (i) it is not a correspondence of *kind* because the organic process is a complex of movements or moving molecules, while the corresponding feeling or idea has nothing in common with movements of anything ; (ii) nor is there indeed any reason to believe it to be a *direct* or *immediate* correspondence ; for there may be other forms of activity of which we know nothing, intervening between the molecular process and the mental one. Of the link of connection between the two series of processes, experimental science can give no account. All that it can say is, that when the one process occurs, the other occurs also.

(c) Another danger to be guarded against in physiological psychology, is that of substituting imagination for fact ; and thinking to explain mental processes by supposing brain ones which are not themselves understood, and which may have no existence in reality, and may not even be possible in terms of

molecules and motion (the constituents of brain),—explaining what is obscure by what is still more obscure. There is danger of substituting in this way a mere mythology of brain-processes for science, and lapsing into something that is neither physiology nor psychology.

But the study of mind cannot limit itself to the outward manifestations and products of mind. It must rise to the realities which manifest themselves in these phenomena, and thereby rise from phenomenology to ontology from science to metaphysic. Hence

B. The Ontology of Mind and its hypotheses.

§ 13.

The Metaphysic or ontology of mind rises from the processes of thinking, feeling and willing to the something which thinks, feels and wills; and studies mind as the reality or substance which manifests itself in the processes and products called mental. In other words, it uses the manifestations or phenomena of mind as means of knowing the reality which manifests itself in them and of understanding its connection with the rest of the world, *viz.*, with nature and God, and thereby its place and function as reality in the system of related realities which constitutes the world. For phenomena must be phenomena of something. If thinking, feeling and willing are phenomena of mind, then mind itself must be something which manifests itself to itself in and through these conscious processes—something which thinks, feels, and wills, and, in so doing, is conscious of *itself* as thinking, feeling and willing and as giving to these states and processes the connection and unity of a single mind. This something is spoken of, from logical analogy, as the subject or *agent* which thinks and wills; and, from an ontological point of view, as soul or mental *substance*; while a familiar term which may be used to include all aspects, is *self* or *ego*—that in us which feels, thinks, and acts, and recognises itself as remaining the same through successive states and activities.

Now, if we maintain that the self is directly conscious of itself as such a permanent reality, this is equivalent to saying that in self-consciousness there is a point at which metaphysic and experience meet and coincide. But the “abyssal depths of personality,” and the innermost connection of the self or person with the rest of the world, lie beyond the reach of

But thought cannot confine itself to phenomena—it must rise to the reality which produces them,

And mental reality is deeper than conscious experience.

And is connected both with the reality underlying the world of nature, and with the absolute underlying

both nature
and mind;

And cannot
be exhausted
by methods
of external
observation
and experi-
ment

Hence se-
paration be-
tween the
empirical and
the metaphy-
sical treat-
ment of mind.

Science pro-
per, it is
said, can
merely regis-
ter phe-
nomena, and
determine the
order in
which they
occur

experiment, and therefore of empirical psychology. Yet the essential nature of the reality which manifests itself in the conscious states, and the connection of this with the other reality called matter which manifests itself in the external phenomena of nature, and with the highest reality which gives law and connection to both, and makes them both to be one world—these are the fundamental questions which give to the study of mind its main interest and importance. And there are questions of metaphysic, or philosophy in the deepest sense.

But these are questions that cannot be settled by direct observation and experiment but only by abstract reasoning; and we therefore separate from the study of the processes, and referred to metaphysic as a branch of philosophy.

For a sufficient account can be given, it is assumed, of the composition and order of the states and processes which make up mind in the empirical sense, and the states and processes of body with which they are connected, without ever considering the question what mind is, or body is, as a thing in itself, and thus a separation can be made between the empirical and the metaphysical treatment of mind and nature. Thus there is an empirical and a metaphysical aspect of mind and the study of both may be called psychology in the widest sense. But in recent English usage the term psychology has come to be almost restricted to the empirical study of mind, and metaphysical inquiry to be excluded from it. Psychology meant originally the "science of soul", but it has come to mean the science without the soul, in the sense that as now studied, it avoids all question of the soul.

Hence the necessity of an *ontology* or *metaphysic of soul*. The word means an inquiry into the substance of soul. But this means really an inquiry into the relation between the soul and the rest of the world in which it lives, *viz.*, the world of physical nature and the absolute reality underlying both soul and nature. For

For reason cannot remain satisfied with merely registering outward phenomena, and inferring from their order in the past, the order in which they may be expected to accompany and follow one another in the future, which is all that empirical science does. It is the nature of reason to seek connection and causation *everywhere*, to seek reasons for everything, and it can do so only by seeking the reality out of which phenomena spring and the reasons which make them to spring out of it. Hence the "metaphysical craving" to reach from phenomena to

reality. And hence the interest and importance of the study of mental phenomena is due largely to the light which it casts on the reality which manifests itself in the phenomena. We have to deal mainly, it is true, with the phenomenology of mind. But it is impossible to study the phenomena without having in the background of our thought some hypothesis as to the substance or reality underlying mental processes. It will be sufficient here to indicate the principal theories regarding mind as soul or substance which have been evolved in the course of philosophical reflection. They are four in number, but may be considered under two heads—dualistic and monistic. Hence first

Hence the impossibility of consistently avoiding metaphysics.

Science of mind must be supplemented by metaphysics of mind.

§ 14.

(a) *The Hypotheses of Dualism.*

The theory of the duality of mind and matter, or dualistic spiritualism, makes mind and matter to be essentially independent substances, neither of them depending for its existence in any way upon the other, but each capable of existing separately without the other—the two being connected together in man (as *soul* and *body*) only temporarily; and that, not by any need or necessity inherent in themselves, but joined together by a force acting on them from without.

Hence the different metaphysical hypotheses:—

Matter is substance having, for its essence, the attribute of filling, moving and resisting motion through space, that is, of extension, motion and impenetrability: and all its attributes are reducible ultimately to modes of these.

(a) Dualism, the theory of two independent substances, extended and unextended—

matter and spirit, body and soul.

Mind, on the contrary, is substance whose essential attribute is consciousness, and all whose known manifestations are modes of consciousness, such as thinking, feeling, and willing. But consciousness and extension are *incommensurable* attributes having nothing in common; a state of consciousness is not extended, and does not resist motion; and a space-filling object, so far as we know, is not conscious.

Thus, each substance has its own essential attribute, and is without that of the other; so that they have nothing in common, beyond the mere fact of their being substances or realities. And, being an unextended substance, mind (under this aspect called soul) will be a simple and indivisible entity;

This theory seems to explain the unity of consciousness and the immortality of soul.

(if it were extended in space it would be divisible into parts); and its "punctual simplicity" may be applied to explain (i) the unity of *self-consciousness*, the fact that all successive experiences are felt as functions of a single unitary self or subject, like rays of light radiating from a focus; and (ii) the *immortality of the soul*, because destruction consists in disintegration, and a simple unit cannot be disintegrated.

But involves many difficulties :

The difficulty of explaining interaction ;

Of explaining how changes of the one correspond to changes of the other ;

And of knowing the existence of an external world,

And of supposing two different kinds of soul.

This dualistic theory is the commonest view of mind-substance or soul ; but (i) it is difficult to understand how two such incommensurate substances, as it supposes soul and body to be, having nothing in common, could have come to be united together as they are ; and (ii) how they could act and react on each other, as they appear to do in sensation and volition—body acting on mind to produce sensation, and mind on body to produce movement. It is commonly supposed that only *like* can directly act on *like*.

(iii) And if they do not react on each other, it is difficult to explain how changes in the one come to correspond to changes in the other—how sensations arise in mind when changes take place in things, and how, when mind wills changes in things, the changes at once follow—a difficulty which led to the old hypotheses of 'occasional cause' and pre-established harmony.

(iv) And the theory makes it difficult to explain knowledge in another respect. If the substances have nothing in common, then the states and products of the one can have nothing in common with those of the other. Therefore ideas will have nothing in common with the things they are supposed to represent, and will give no real knowledge of them ; so that knowledge of the external world will be impossible. Therefore there will be no reason for assuming the existence of an external world at all—it will be, as Berkeley argued, a useless hypothesis.

(v) If the mental *principle* is something put into the organism from without, it will be different from the *vital principle* which revolves and activates the body from within ; so that we shall have to assume two souls, (1) an animal *soul*, *viz.*, *life* or *vital force*, to carry on the work of the organism, and (2) a rational *soul* as the thinking subject. Hence these difficulties of dualism have given rise to

§ 15.

(b) *The Monistic Hypotheses.*

The monistic theories assume that there are not two fundamental realities or substances but only one, so that the seeming duality of soul and body is only an appearance. These include several forms of theory. Thus

I. *Materialism* consists in affirming that the only ultimate reality is matter (which is assumed to exist objectively and absolutely, in all essentials, as it appears to the senses); and that mind has no substantial reality of its own, but is only the series of conscious states, and these are in some way derived from, and dependent on the material body, and have no existence apart from it, being in fact only functions or products of the organized matter of the brain. As the steam-engine produces motion, so the intricate complex of forces in the animal organism produces a total sum of effects, which, when concentrated by the mechanism of the brain into a more or less connected aggregate or series, are called feeling, thought, mind.

The older materialists supposed that there is a material soul, consisting of a system of atoms of finer quality than other atoms, contained somehow within the brain, and responding by vibrations of extreme rapidity to every impression from without; and that consciousness is the result somehow of their vibrations.

Later materialists think rather than mind is not a product of any special system of atoms within the brain, but a function or resultant of the co-ordinated activity of the brain and organism as a whole. Whenever the brain rises to a certain kind and degree of physical and chemical activity, then consciousness in some way results, and goes on varying in kind and degree as the brain activity varies; and the "stream of consciousness" thus elicited, constitutes what we call mind. Mind is only a collective term for the series of conscious states, and goes on continuously so long as the organic processes are uninterrupted, which produce it.

Mind, therefore, has no substantial reality of its own. It is but the stream of sensations and ideas, and these spring out

(b)
Monism ;
the theory
of one
substance,
including -

1. Material
ism, that the
one substance
is matter,

and mind its
product ;
whence the

Theory of a
material soul,
contained in
the brain,
and the

Theory that
mind is a
function, or
product of
brain as a
whole—

That brain
secretes
thought as

the liver secretes bile,

Or that the surplus energy of the brain transforms itself into consciousness,

Or that consciousness is an inessential by-product or epiphenomenon.

But materialism involves many difficulties :

The products of matter are all modes of

of the vibrations and disintegrations of the molecules, as a stream of flashes results from the continuous friction of two solid bodies, or the flame of a candle from the rushing together of oxygen and carbon molecules. When the molecular activity rises to a certain degree of intensity (called the *threshold point*) and produces more energy than is needed for the carrying on of the physical processes, then consciousness appears, just as if the surplus energy were in some way transformed into feeling. Thus the working of the brain produces consciousness just as it produces heat. But when the molecular activity sinks below a certain intensity, then consciousness fades away—mind ceases to exist—as in sleep. It is a purely surplus by-product of the working of the organism, and possesses no causal power of its own ; that is, it does not react on, nor modify in any way, the molecular processes out of which it springs. In other words, the chemical and mechanical processes which produce thought are not themselves affected in any way by the thought which they produce—any more than the hurrying train is affected by the shadow which it casts, or the strings of the harp by the notes which they emit,—but go on automatically according to their own physical laws ; and it is the same to the processes themselves whether consciousness rises out of them or not. The living man, therefore, is an automaton of extreme complexity and refinement, kept working entirely by the physical forces of nature ; and in its working produces consciousness as an inessential by-product, just as it produces more heat than it needs, or as it casts off carbonic acid. But

(1) The great difficulty of materialism is to explain whence consciousness comes, and whither it goes. The theory practically assumes that it rises out of nothing and sinks into nothing again. Can it really rise by transformation of any of the physical forces at work in the brain, as one form of physical energy is transformed into another, in accordance with the law of the conservation of energy ? No ; the different physical forces are really different modes of motion, that is, are really movements of molecules and masses, moving in different ways. And the principle of the conservation and transformation of energy means merely that movement which disappears in one form, reappears always in another. Hence, if consciousness were produced by the transformation

of any of these forces—chemical, thermal, electrical—then consciousness also would consist in a mode of motion, that is, would be a distinct and peculiar motion of molecules, different only in form from their other ways of moving. But consciousness is essentially different in kind from any mode of motion.

motion,
which mind
is not.

(ii) And further, if any of the physical energies were transformed into thought-energy, then, during thought, a certain amount of activity in the form of motion would disappear, in order that an equivalent amount might reappear in the form of thought; so that in mental work there would be a reduction of the amount of physical activity in the brain. But on the contrary the amount of brain-work is immensely increased, rather than reduced, during thought and feeling. Indeed the physical forces—molar force, heat, light, chemical attraction and repulsion, electricity—form a closed circle, within which one mode of motion can be transformed into another, but none can pass outside the circle, and be transformed into anything else. Therefore it is impossible that thought can be produced by any transformation of physical energy.

All new
modes of
motion imply
loss of quan-
tity in other
modes;

(iii) Again, materialism makes it impossible to explain the *unity* of self-consciousness. The brain is composed of innumerable atoms and molecules, millions of cells, and thousands of ganglia, all undergoing incessant disintegration and recombination, leaving nothing that is one and permanent. How, then, can the action of such a multiplicity of parts be conceived to produce that focal unity of consciousness which is essential to mind—in which every state and process is felt as the function of a single permanent self?

And the
theory is
inconsistent
with the
unity of self,
and

(iv) Finally, materialism involves a logical paradox. Organism and brain are themselves known to us only as *external phenomena*, that is, only through and in terms of our own sensations, which are themselves processes of mind occasioned from the outside. They are known therefore only as conceptions of the mind's own construction. And, in thinking of matter as objective (*i.e.*, extramental) reality, mind is abstracting from itself,—*projecting*, and ascribing *objective reality* to—an idea which it has itself constructed. Hence matter as conceived by mind, is, in a sense, a product of mind.

Explaining
mind by
matter is ex-
plaining what
is known by
what is less
known,

Or explaining
mind by its
own product.

Therefore matter has to be explained and accounted for by means of mind ; and not mind by means of matter. Thus, as a psychologist, the materialist is obliged to explain matter by means of mind (by sensation, construction, abstraction, objectification) ; but, as a metaphysician, he turns round again, and tries to explain mind by means of matter ; and is guilty, therefore, of the vicious circle in reasoning.

Brain is not the agent but the instrument of thought.

Hence, though the processes of organism and brain are undoubtedly instrumental to thought—though it is through them in some way that mind realises itself as a self-conscious factor of the world-system, and enters into communication with the rest of the system—yet no molecule, nor cell, nor ganglion, nor brain as a whole, can be regarded as itself the *thinking principle*,—the *agent*, or ultimate *reality* which thinks, feels, and wills. We may admit that brain and body are the medium through which the world is thought and known ; but this is not the same thing as to say that the brain itself is that which thinks and knows.

The difficulties of dualism which makes mind and matter to be both substances, and of materialism which makes matter to be the sole substance and mind only one of its attributes, suggest another hypothesis, according to which neither mind nor matter is substance by itself, but both are correlative attributes of one and the same substance. This is the hypothesis of

2. Spinozism : that the one substance is neither mind nor matter ;

II. Universal Parallelism—the theory worked out theoretically by the philosopher Benedict Spinoza : that reality consists of one substance with two attributes or aspects ; and that mind and body are not two substances, but only correlative aspects, internal and external, of one and the same substantial reality, so that every mode and change of the one aspect corresponds to a mode and change of the other. Thus, as the spoken proposition is a series of sounds, and the written one, a series of visual forms, and yet they both correspond to one process of thought in the mind, which expresses itself at the same time in both—so, in the world, one absolute reality expresses itself in two parallel series of phenomena, of which one constitutes the mental, and the other the material world.

But that the worlds of mind and matter are parallel manifestations of one active

In other words, there is but one substance or ultimate reality, and it is, by itself in the abstract, neither mind nor matter. But substance is nothing without attributes ; and the ultimate substance has two fundamental attributes which may be spoken of figuratively as two sides or aspects of the

same thing. Now these correlative attributes of the one substance are *thought* and *extension*. But substance, to be infinite, must realise its infinite nature in an infinity of modes or activities. And its activities must appear under each of these correlative aspects of thought and extension. Thus from one point of view, they will appear as a series of changing ideas and feelings, and constitute the world of mind. From the other, they will appear as a series of moving and changing things in space, and therefore as the material world. But it is one and the same substance, and one and the same fundamental activity, that manifests itself under these two aspects.

Thus, to external perception (*i. e.*, when we open our eyes and look round about us) reality appears under the form of extension, *i. e.*, as a plurality of units existing external to one another, under the changing relations of space, and therefore as extended things. To self-consciousness (*i. e.*, when we turn our attention upon the states and activities of our own mind) it appears as units and relations of consciousness and therefore as mind. Thus for every unit and change of extension, there is a unit and change of consciousness. And, as many units or *quanta* of extension coalesce together externally into larger wholes, constituting organic and organisms; so, internally, the corresponding *quanta* of consciousness coalesce into ideas and organized systems of ideas, constituting mind. And as all the forms of extension coalesce together so as to constitute the organism of all organisms, which is nature as a whole: so, all the corresponding forms of consciousness, and aggregates of consciousness constituting finite minds coalesce together into one universal consciousness, or idea of all ideas, which is God.

Hence mind and body are two aspects of the same reality, like the concave and convex sides of the same circle. Inwardly, the individual appears to himself in his own consciousness, as a connected series and system of feelings and ideas, that is, as mind. Outwardly, to others (and to himself when reflected from without), he appears as a connected aggregate and system of extended parts, that is, as body.

This theory as a single "double-faced reality," of which mind and body are the internal and external aspects (or posi-

self-evolving reality.

Every mode of the one corresponding to a mode of the other.

Whence nature as resultant of all finite modes of extension,

And God as resultant of all modes of thought—the idea of all ideas.

To ourselves we appear inwardly as mind, to others outwardly as body.

This theory would account for the

origin of
mind,

tive and negative poles, as some have expressed it), has recently been revived and adopted by Bain, Spencer, Wundt, Paulsen, Hoffding, and many others, and held to be the metaphysical theory most consistent with the results of experimental investigation. It explains the favourite axiom of empirical psychology—the law of correlation, that “for every mental state and process there is a state and process of the material organism”; and enables this proposition to be converted and generalized into the proposition, “for every material state and process in the world there is a corresponding mental one”—if not in any finite individual, yet at least in universal mind. It thus obviates the difficulty of explaining the origin of mind, which weighs both on dualistic spiritualism and on materialism, *viz.*, by making it to be present in some form universally; so that we are not compelled to think of mind as something which springs out of nothing and sinks into nothing again, but can understand it as the concentration and organization of something which exists universally, in more elementary forms. And it appears to remove the difficulty of explaining how mind acts on matter and matter on mind, *etc.*, by making them to correspond, not as cause and effect, but as common and correlative effects of the same cause.

Thus we can suppose that for every unit even of inorganic matter there is a unit of consciousness; and just as the units of inorganic matter may be organized and made to coalesce into physical organism, so their concomitant units of consciousness may be correlated and made to coalesce into mind. In other words, we can suppose that it is correlation and continuity of consciousness (memory) that makes mind; and that in inorganic matter there is no mind merely because there is no connection and co-ordination of conscious states.

Nevertheless, when closely examined, parallelism is found to involve difficulties.

But cannot
be maintained
consistently;

(i) It is difficult to explain mind and matter as merely parallel, and on the same level with each other. Rather one must be conceived as propelling or leading, and the other as resultant, product, or instrument. Thus parallelism is always either falling back into materialism, giving the leadership to the physical forces of matter, and making consciousness to be merely an occasional product or overflow of these; or moving forward into idealism, giving priority and leadership to idea and making will guided by idea to be the evolving force underlying all things.

For either
mind or
matter must
be ultimate
and produce
the other,

(ii) It is especially difficult to prevent parallelism from becoming idealism for this reason: it involves the same difficulty of explaining knowledge as dualism does. Thought and extension are attributes having nothing in common. Therefore the ideas or modes of thought constituting mind can have no community of kind with modes of extension constituting the material world outside of mind.

But if this be the case, extension will be only a form of thought, and the world outside of mind will be to mind only an unknown and unknowable something which is of no importance to mind—which is idealism.

(iii) Again, it is difficult to establish such complete comitance between the mental and the physiological as this hypothesis assumes. We know that sensation and feeling and concrete imagery have physical processes corresponding to them, and that mental work involves brain work; but it is difficult to understand how the processes of thought proper, such as understanding and reasoning can have any physical correlate. In higher thought the mental principle seems to rise above the organism and use it as its instrument.

Leading either to materialism or to idealism.

Hence there be a contradiction in conceiving matter as something non-mental and yet as producing mind (as materialism does), and if it be impossible to conceive mind and matter as two sides of the same thing (as parallel to does),—then it becomes necessary to consider whether mental power may not be conceived as evolving the world of nature by its own energy, and using it as the material of its own thought, and as the means of realising itself as self-conscious mind. Hence the hypothesis of

Hence a third hypothesis is necessary.

III. *Idealism*.—According to this hypothesis the ultimate reality is an energy which is mental in this sense at least, that it is essentially a striving to become mind, that is, to become aware of itself as self-conscious spirit; and in this striving evolves the world of nature as the material of its thought and activity; and through nature and organization, realises itself at last as self-conscious mind—both as finite minds which evolve and become conscious of themselves in and through finite organisms, and as universal mind which becomes conscious of itself as the universal creative energy evolving and containing all finite things and minds within it—"the one wide will which closes all." This system may be called *idealism*, because it makes the world-process to be the realizing of an *end* present as *idea*; or *spiritualism*, because it makes the essence of the world to be a power which conceives and realises idea, and in so doing realises and becomes conscious of itself as spirit.

3. Idealism, that the one substance is essentially mental;

And that the world is produced by a mental power realizing its own nature as self-conscious reality.

This monistic spiritualism may be said to make mind both the *beginning* and the *end* of the world-process. It has its beginning as energy, impulse, or the *will* to be real; and its

end as completed, perfected, fully realised *reality*, which is *self-conscious spirit*—reality which has become *real to itself and for itself*, which is reality in the highest sense.

This view therefore differs from materialism, and from dualism.

And from Spinozist parallelism.

By giving the primacy to mind.

And at the same time avoids the difficulties of dualism :

And especially explains the nature and origin of knowledge, which none of the other theories does.

According to this view, body is not something which precedes, and can do without mind, and only accidentally gives rise to it—casting it off as a collateral, inessential by-product, as grating machinery casts off a stream of sparks (materialism). Nor is the soul or mental substance something extraneous and indifferent to body, and inserted into it from without (dualistic spiritualism). Body is the system of means which the mental power evolves and organizes for itself, in order, through it, to perfect itself as concrete, conscious, self-contained, individual mind. And it has the advantage over the Spinozist duality of corresponding aspects in this, that it vindicates the primacy of mind over matter, making mind to be both the *energy* or *striving* (*viz.* as *will*), and the *end* towards which it strives (*viz.* as *self-conscious spirit*); and matter to be the intermediate *means* through which it strives to attain its end.

This theory of *idealism* or *monistic spiritualism*—which was implied in Plato and Aristotle, but was first clearly stated by Berkeley, and worked out with most logical rigour by Hegel—does not commend itself to purely experimental investigators so much as the Spinozist hypothesis, but accords better with the prevailing philosophy of evolution. It avoids some of the difficulties involved in dualism. Thus

(i) It obviates the need of assuming two souls—an *animal* soul as vital principle to animate the organism, and a *rational* soul as thinking principle—because, according to it, the vital principle which evolves the body is also that which rises into self-consciousness as mind—mind is life in a more highly developed form. And

(ii) It obviates the difficulty of dualism, *viz.*, how, if matter and mind be incommensurable substance having nothing in common, the material world can be perceived and comprehended by mind. For according to it, the conception of the world which thought constructs within the mind, will be a *reproduction, in terms of finite mind, of what has been produced already by infinite mind*. The finite

mind finds itself at home in nature—finds laws and processes which it can comprehend—because nature has already passed through mind, and its forms and laws are products of mind-power. In other words, it gives a better explanation of knowledge than the other theories.

The above are the principal hypotheses arrived at by the metaphysic of mind, and between which it has finally to decide. But before there can be any hope of understanding the essence of mind—to decide between the above hypotheses—it is necessary to study the phenomenology of mind. The essence can be understood only through its manifestations of itself in phenomena. We are concerned here, mainly therefore with the phenomenology of mind—*viz.*, the series of conscious processes which constitute mind in the empirical sense, and the corresponding series of physical processes by which the mental are brought into connection with the rest of the world. We begin with the latter series—the organs and processes through which mind expresses itself outwardly.

These hypotheses belong however to the ontology of mind, whereas we are concerned mainly with its phenomenology.

PART II.

ORGANISM AND MIND.

IV.

THE ORGANIC EMBODIMENT OF MIND.

§ 16.

There is a life power which is the organism and differentiates it into many organs, each with a function of its own;

And makes the organs co-operate in a unity of one in many.

And thereby raises itself into consciousness of the whole, and thereby into being mind.

But experiential mental science avoids the question what mind is, and restricts itself to the phenomena or

The organism begins as a germ-cell of microscopic dimensions. This cell contains in it the power which we call life. This life-power draws in and assimilates materials from the outside and thereby expands and divides its single primitive cell into an organized system of many cells—differentiating these cells into tissues of bone and muscle, organs of nutrition and circulation, and organs of co-ordination and regulation, *viz.*, nerves and brain. At a certain stage in the development of organic life, consciousness appears in connection with the organic processes, most directly with those of the nerves and brain ; and rises at last into *self-consciousness*, and thereby into conscious self or mind. The power which thus becomes aware of itself as mind re-acts on the subordinate processes of the organism, subjects them to itself, most directly those of brain, nerves, muscles and organs of sense ; and makes them the means by which it receives influences from, and exercises influences of its own, upon the external world. This close relation between mind and organism, both in their development and in the work which they perform, makes it necessary that psychology should study the processes of organism which are thus essentially connected with those of mind. Analytical psychology of the processes of thought has to be supplemented by physiological analysis of the organs of thought.

But the common empirical psychology (in conformity with the limits which it imposes upon itself as a science of phenomena only), excludes the above question of the nature and ultimate relation of mind and body, soul and matter, as ultimate realities. It regards the mental and the organic as two series of phenomena merely, and limits itself to analysing these

phenomena, and determining their relations of order and dependence. Thus, on the one side, there is the series of conscious states and processes which constitute the mental life; and on the other, the series of molecular combinations and disintegrations which make up the life of the organism and form the medium of connection between the mental series and world of things beyond the organism. And, for the general relation of the series (in order to avoid committing itself to any metaphysical theory as to their origin and connection), it lays down provisionally, or as sufficiently well established experimentally to serve as a "working hypothesis," the principle of concomitance or parallelism, *that for every state and process of mind there is a corresponding state and process of the organism.*

Of this correspondence between mind and body three forms or phases may be distinguished, corresponding to the three main phases or functions of mind. It is seen

(i) *In sensibility, or mental receptivity*—in which mind is acted on from without, and brought into correspondence with the external world—the impressions made externally by physical forces on the organs of sense are propagated inwards through the organism to the brain, and the resulting molecular processes of the brain are accompanied by the mental processes called sensations, as pressure, heat and cold, sound, colour, taste and smell. Here, then, the mental processes are made to correspond to bodily processes by an external influence.

(ii) *In intellectual activity*—in which mind interprets the sensations thus impressed upon it, turns them into ideas, and, uses them as materials for knowledge and feeling (as when it remembers, imagines, reasons, and feels fear, anger, hope, sympathy, and the like). At this stage, at least, it might be supposed that the mental is completely isolated from the physical, and that there are no bodily processes at all corresponding to these mental ones. But closer observation shows, on the contrary, that there is not only an increase of circulation, and heat of the brain, and therefore of molecular work there, but also an ebb and flow of activity through every part of the organism, corresponding to the kind and intensity of the

manifestations of mind.

These include the way in which mind manifests itself in and through the body:

For every mental state has its organic embodiment, and an organic process corresponding to it.

This corres-pondence of mind and body is seen in sensation in which mind is affected by the external world;

In thought, which rises out of sensation and test-ing which rise out of thought,

thought and feeling. Here, also, therefore, there is correspondence between mental and physical.

And in volition, in which mind reacts on and effects the external world.

(iii) And finally *in conation, or mental reaction on the outer world*—in which mind, prompted by its feelings, and guided by knowledge already acquired, reacts on, and occasions changes in the external world. Here the mental processes of desire, volition and effort are accompanied by molecular process of brain and organism, which result in an outflow of force by special nerves to contract certain muscles, and move certain limbs, and thereby produce the desire changes in things.

But empirical psychology cannot say that things cause sensation, nor the mind causes change in things.

But only that their changes correspond, those of the one with those of the other.

Thus each of these fundamental processes of mind is accompanied by processes of body. In the first and last of these cases, to be sure, the relation might appear to be one of sequence rather than of concomitance. The physical impression on the organism seems to precede the sensation ; and the mental desire and volition seem to precede the voluntary movement. And precedence seems to suggest *causation*, *viz.*, in the sense that the physical impression *causes* the sensation, and the volition *causes* the movements of the limbs. But to say that there is a *causal* relation between mind and body—that matter acts on mind and mind on matter—would imply a *metaphysical* theory of mind and matter as they are in themselves ; and this is what empirical science must avoid. And further, causation in nature means the change of one mode of motion, *e.g.*, molar, chemical, or electrical, into another—all physical work consisting in movement of masses and molecules in spaces. But consciousness cannot be conceived as a mode of motion, or movement of molecules. Therefore we cannot conceive a *casual* interaction between mental and bodily processes, without having recourse to some metaphysical theory to explain it. Therefore empirical psychology must remain satisfied with expressing the relation as one of parallelism or concomitance merely—with saying that sensation *accompanies* the physical impressions on the body, and that movements of body *accompany* desire and volition—without assuming that the bodily states actually *cause* the mental, or the mental the bodily (hence the favour of many psychologists for the parallelist hypothesis of Spinoza).

What bodily processes, then corre-

Granting, then, that there is such a general concomitance and correlation between mental and organic processes, we

have to enquire : *with what class of organic processes do mental processes most directly correspond?* It may be thought, indeed, that consciousness cannot be "seated" in any particular part of the body, but is "all in every part," and corresponds equally to the whole, because the co-operation of the whole is necessary to the healthy working of every part. But the organism is composed, of many parts, and these parts require to be co-ordinated, or made to work together as one complex system ; and this co-ordination, we know, is effected through the *nervous system* ; and, of the nervous system, the central and controlling portion is the *cerebro-spinal axis*, and more especially its upper part, the *cerebrum*, to which all lines of communication converge. And we find that no change in any part of the organism enters into consciousness until its effects have been propagated along nerves to and through the upper brain.

Hence, even if we venture upon a metaphysical theory of the relation of mind and body, and (1) say with idealists that it is mind that evolves and co-ordinates the organs as its means of entering into relation with the rest of the world, we must admit that it is through the nervous system that it co-ordinates them. And if (2) we hold, with materialists, that it is the co-ordinated processes of the organism that make the series of conscious states called mind, we must admit, that it is through the working of the nervous system and brain that they make them. And if (3) we persist in going no farther than the empirical theory of parallelism, we find that it is processes of the nervous system, and more especially of brain, that are most directly parallel to mental processes. This is all that is meant by saying that brain is the "seat" or "organ" of mind.

§ 17.

And that there is a correspondence between mind and brain, more direct than between mind and the rest of the body, seems to be proved by abundant experimental evidence :—

1. All the lines of communication which co-ordinate the different parts of the organism converge to the brain and when communication is cut off between the brain and any part of the body, owing to the nerves of that part being diseased or cut, then there is no longer any feeling or sensation connected with that part. It becomes insensible to stimulus of every kind. This

pond most directly with mental processes ? Is there any bodily seat of mind ?

Only in the sense that there is one part of the organism through which mind controls the rest.

This must be admitted, whatever theory be adopted of the relation of mind and body.

That mind controls body through the medium of the brain, is proved by experimental evidence.

For stopping communication between body and brain stops sensation ;

seems to prove that the feeling is not really in the part itself—that the effect of the injury has to be transmitted along the nerves to the brain before there can be any sensation ; and that the sensation corresponds directly with a state of the brain, and only indirectly with the state of the part itself.

We imagine, of course, that taste is in the tongue, touch in the skin, and the pain of the cut, burn, or bruise in hand or foot ; but we shall see that this is only an acquired habit by which we learn to localise our sensations in the parts in which their causes lie.

Time is required for transmission of influence to brain before sensation is felt ;

2. Psycho-physical experiments prove that there is a measurable interval of time between the application of a stimulus to any organ and the corresponding sensation, e. g., between the application of a sharp point, or hot iron to the hand or foot, or the striking of a wave of ether against the retina, or of air against the drum of the ear, and the sensation of pain, light, or sound.

This proves that some process intervenes between the stimulation and the sensation ; which can hardly be any other than a process of transference along the nerves. And the fact that brain is the centre towards which all the nerves of the body converge, points to a conveyance of influence to, and concentration of consciousness by means of the brain.

3. This result is confirmed by what is known as to the state of the brain during thought and emotion—

Mental work is accompanied by flow of blood to and increased activity of brain,

(1) Thought and feeling are accompanied by a greatly increased flow of blood through the arteries and veins of the brain centres, and by a great increase of heat in the brain ; which proves that an increase of *mental work* is accompanied by an increase of *brain work*, and therefore that they correspond to each other in some way ; while any check to the supply of blood weakens thought and soon leads to a cessation of consciousness. Indeed it is found that though the brain is in bulk only about $\frac{1}{10}$ th of the bulk of the whole body, yet about $\frac{1}{4}$ th of the whole blood of the body is used up by the brain.

And by production of waste materials which can come only from brain ;

(2) This is further confirmed by the fact that intense mental activity of any kind is always followed by a casting off of certain waste materials which are known to be derived from the brain, proving that there has been increased brain work and consumption of brain materials. Thus the quantity of phosphates and sulphates cast off varies with the amount of mental

excitement, and these are products resulting chiefly from the waste of brain substance.

(3) Prolonged thought and intense emotion produce a feeling of fatigue and exhaustion in the head, until it is restored by rest; and, if carried too far, produce pain and disorder of the brain. And a blow on the head, or a shutting off of the blood-supply, at once causes suspension of consciousness.

While
mental work
exhausts the
brain.

4. Comparison of the brains of the different species of animals, and different races of men, and even of different individuals, shows that there is a connection between intelligence and the size and complexity of the brain. Generally speaking, the larger the brain is in relation to the rest of the body, and the more complex the convolutions of the hemispheres, the higher the intelligence. The average brain of civilised men weighs about 49 oz.—that of savage races, about 4 or 6 oz less. Men of genius have risen as high as 64. Idiots may not rise above 30 and may sink as low as 10. Indeed 30 oz. appears to be the minimum for rational mind. Comparatively small brains, however, may be superior in complexity and organization, while larger ones may be inferior in these respects. Hence the number of cells and nerve-fibres, if it could be estimated, would be a surer index of intelligence than size taken by itself. Intelligence is not a matter of bulk and weight merely but of differentiation and co-ordination also.

And there is
a correspon-
dence be-
tween mental
power and
the size and
complexity of
the brain.

It is assumed, therefore, that brain is in a special sense "the organ of mind,"—that organ the process of which correspond most directly to mental processes—some speaking almost as if a brain were itself, sufficient for mental work, without a body. There is reason to believe, however, that the brain is merely the organ of unification, through which the organs of the body are co-ordinated and made to work in harmony so as to constitute a single organism; and that feeling results, not from the working of the brain merely, but from the co-ordinated working of the whole organism. Nevertheless, the very fact that the brain is the centre or channel of co-ordination, gives it a more direct connection with mind than the rest of the body has.

Hence brain
is said to be
the sensori-
um, or seat of
conscious-
ness.

It follows from this correspondence between mind work and brain and nerve work that physiological psychology is concerned mainly with the structure and working of the nervous system, which, being the apparatus through which the different

Hence psy-
chology is
concerned
with the
working of
brain and the

nervous system,

organs of the organism are made to work in co-ordination with one another, must be for that reason the apparatus through which mind more specially manifests itself.

Consisting of centres and lines of communication.

Now the nervous system consists of two principal parts—the *vertebro-spinal axis*, which consists of the *spinal cord* (contained within the back-bone) with its enlarged continuation, the *brain* or *encephalon* (contained within the skull-bone), and constitutes the central and most vital part; and the *nerves* themselves, which form the lines of communication between the central axis and rest of the organism, and carry currents of influence inwards and outwards; thereby regulating and co-ordinating the working of every organ, cell and fibre, and making the many organs to work together as a single organism.

Hence first as to—

§ 18.

A. The Lines of Communication.

The lines of communication consist of nerves, cranial and spinal:

The *nerves*, as they appear to the naked eye, are white threads which can be seen issuing, (1) some directly from the brain through holes in the skull-bone, and entering into the organs of sense contained in the head, *viz.*, the eye, ear, etc. (and therefore called *cranial nerves*); and (2) some from the spinal cord contained within the back-bone, from which they run outwards through the body, finally branching out, and disappearing in the muscle-fibres, and under the surface of the skin (called *spinal nerves*).

Nerve threads composed of fibrils;

But those nerve-threads which are visible to the naked eye, when examined microscopically, are seen to be really bundles, containing thousands of extremely slender fibrils which are the real nerves. These ultimate nerve-fibres are in some places from $\frac{1}{1000}$ to $\frac{1}{500}$ of an inch in diameter, but, towards their extremities, may thin away to $\frac{1}{1000}$ or even $\frac{1}{5000}$. The optic nerve contains hundreds of thousands of fibrils.

Nerve fibrils composed of cylinder and protective coats;

The ultimate fibrils themselves are composed each of (1) a central *core* or *axis-cylinder* of transparent protoplasmic substance, which is the essential part of the nerve, and carries waves of excitation from the external world inwards to the brain, and from the brain outwards to the organs and limbs:

and in most cases (2) two sheaths of tough white material, which surround and insulate the axis, as the wires in a telegraph cable have to be protected and insulated, to keep the currents of one from mingling with those of another.

The old opinion with regard to the nerves was that they are hollow tubes, and that communication is by means of a subtle fluid called "animal spirit," distilled from the blood by the action of the heart, drawn into the nerve-tubes, and made to flow inwards to the brain by impressions from without, and outwards from the brain to the limbs by effort of will. But it is now known that there is nothing that really flows; that communication is by an agitation of the molecules of the core, propagated inwards and outwards—whether it consist in chemical disintegration of the molecules, or merely in vibration of their atoms. Nevertheless we speak of this propagation as a *current* for the sake of convenience. It is understood not to be continuous, however, but to consist of successive waves, throbs or pulses running along the core.

Nerve currents, not currents of liquid, but of vibration of chemical change.

But the nerves, though the same in appearance, are really of *two kinds serving two purposes* :—

Nerves are of two kinds, serving two purposes ;

(1) One class serve to carry *inwards to the brain* (from the organs of sense, muscles, and surfaces of the body) those currents which are stimulated by external things and forces, such as light, heat, pressure, etc., and which give rise to sensations of colour, sound, taste, smell, touch, etc., corresponding to these forces. These are called *afferent* or *in-carrying* nerves, because they carry currents inwards from the external world to the brain; and *sensory* nerves, because they carry those currents which give rise to sensations.

Afferent, carrying influences from without inwards and giving rise to sensation.

The ultimate fibres of the sensory nerves are exceedingly minute, their axes being generally not more than $\frac{1}{10000}$ of an inch in diameter; and in the sensitive surfaces of the sense-organs, (e.g. the retina of the eye), they can be seen spreading out in a network, and terminating each in a minute protoplasmic bag or nerve-cell, much like those from which they start in the brain. Now, external forces, such as pressure, or waves of air or ether, striking against these surfaces, set up some kind of process in these terminal cells; which, again, sets up an ingoing current to the brain (somewhat as the electric battery sends its current along the wire); and this current sets up those processes of the brain which correspond directly to sensations in the mind.

Springing from the outer sense organs and ending in the brain ;

(2) Another class of nerves serve to carry currents *outwards from the brain* to the muscles of the organs and limbs.

And efferent, issuing from

the brain, and carrying influences from mind outwards, and giving rise to movements.

These two kinds being distinguished from one another in the anterior and posterior roots of spinal nerves.

and give rise to contractions of the muscle-fibres, and thereby to motion of the limbs. Hence these are called *efferent* or *out-carrying* nerves, because they carry currents outwards, and *motor*, because they excite motion. Most of them are *voluntary*, that is, the currents which they carry are under the command of will, as those which move the eyes and limbs; but some are *involuntary*, *i. e.*, the currents which they carry, and the movements which they produce, are not under the command of will, *e. g.*, those which keep up the movements of the heart, and processes of circulation and digestion.

Though the two classes of *sensory* and *motor* nerves are the same in appearance, and most of them for the greater part of their course are bound up in the same bundles, (forming the silvery white threads which the unaided eye can trace, issuing from the back-bone, and branching through the body), the distinction between them was discovered in this way: It was observed that every spinal nerve-thread issues from between the vertebrae of the spine in two branches—an *anterior* and a *posterior* one—which after a little, join into one bundle. Now, it was found that, when the *anterior* branch of nerve-thread was cut in any animal, it lost all *power of moving* the limb into which that particular nerve-thread goes and branches out: but retained the *sensibility* or feeling of the limb. In other words, it continued to be sensible to touch, burns, cuts, etc., in the limb, though it could no longer move the limb. But on the other hand, when the *posterior* branch was cut, it lost all sensibility in the limb, but retained the full power of movement. This proved that the nerve bundles contain two kinds of nerves, one kind in carrying and sensory, the other out-carrying and motor. So much for the lines of communication. Next as to—

§ 19.

B. The Centres of Activity.

The nervous system includes a central axis composed of white and grey substances:

The cerebro-spinal axis is composed of two kinds of material, *white* substance and *grey*; and includes, as its principal parts, the *spinal cord*, or column of soft nervous matter contained within the back-bone (commonly called the *medulla*, or spinal marrow) which enters the skull from below, and spreads out into the larger bodies which constitute the *brain* or *encephalon* (*i. e.*, contents of the head). We consider first the nature of the white and grey materials composing the axis; then the different bodies included in the axis; and finally

the functions or uses of the different materials and bodies.
Hence—

I. As to the *materials* of the cerebro-spinal axis—

(a) The *white material* is found, on microscopic examination, to consist merely of masses of nerve-fibres, which enter between the vertebrae of the spine and, forming the outer layer of the cord, ascend the interior of the spine to the brain ; where they spread out, and finally enter into the grey masses of the upper brain ; and thus serve to connect those grey bodies with one another, and with the rest of the organism. Thus they are merely channels of communication.

The white material consisting of nerve fibres,

(b) The *grey material*, which is the most vital part of the animal organism, and in some sense the very seat of life, and the part to which the other materials and organs of the body are subsidiary as means to end—requires further consideration.

The grey material composed of nerve-cells.

On microscopic examination the grey substance is found to be composed mainly of minute sacs, called *cells*, varying in size from $\frac{1}{250}$ th to $\frac{1}{500}$ th of an inch in diameter, and containing the liquid albuminous substance called *protoplasm* (primitive substance), or *bioplasm* (substance life). The protoplasmic cell is not indeed limited to the brain, but builds up the vital parts of every organism, both plant and animal. Indeed it is the ultimate unit of all organisation and life ; every living thing begins its existence as a single cell ; and the most complex are built up of cells and materials secreted from, or produced by modification of cells (as wood and vessels in plants, and bone, vessels, and muscle in animals and man).

Nervo-cells, only special forms of the cells which constitute the growing and living tissues of every organic creature,

The lowest organisms consists of single cells, each a complete plant or animal in itself (unicellular), as seen in thousands in a drop of turbid water ; or mere clusters and colonies of cells without any differentiation of parts and function. In the higher plants and animals (multicellular), particular cells and cell-clusters assume different forms, and perform different functions (growing cells, secreting cells, vessels, bark, wood, bone, muscle, brain) ; and in the highest animals all the cells of the body come to be subordinated to a special class of cells called *neurons* or *nerve-cells*, which (as we rise in the animal

And which, by multiplication and modification of them selves, build up every organism,

scale) become concentrated more and more within the cavity of the spine and the skull, and constitute the cord and brain.

The organic cell being filled with albuminous substance called protoplasm and containing a nucleus;

Modified into tissues as bark and wood in plants, flesh and membranes in animals,

But found working unmodified in the more vital parts of the body, and in the nerve-centres which regulate the working of the body.

Nerve cells communicate with one another by off-shoots or branches of their substance, called processes;

The vital cell in general consists of (1) a *cell-wall* or membrane, containing the protoplasm; (2) the *protoplasm* itself, a granulated liquid similar in appearance and composition to the albumen of an egg, and considered to be in some sense the physical basis of life, or material in which life is seated and through which it works, because life is never found apart from it (idealism and vitalism holding the protoplasm to be a product of life, and materialism making life and mind to be products of protoplasm); and (3) a minute roundish body embedded in the liquid protoplasm called the *nucleus*, generally containing a smaller body called the *nucleolus*. The nucleus would seem to be the centre of the cell's life, for when it is injured the cell dies. Cells multiply (and organisms thereby grow) by division of single cells into pairs, and the division takes place across the middle of the nucleus, each half forming a new cell. It is not certain, however, that cell-wall and nucleus are absolutely essential to life; there appear to be still more minute globules of living protoplasm without either cell-wall or nucleus. These, therefore, will be more primitive than the nucleated cell.

In man, vital cells in their original form line the inner surfaces of the secretive and digestive organs, carrying on the work of eliminating waste products from the blood, and assimilating nutritive materials into the substance of the body; and, as *nerve-cells*, they (1) form the *end-organs* of the sensory nerves in the eye, ear, skin, etc., from which, when stimulated by forces from without, the sensory or ingoing currents proceed inwards to the brain, and (2) make up the *grey matter* of the cord and brain, in which all the sensory nerves of the body terminate, and from which all motor ones proceed. Bones, vessels, and muscles are formed by modification of cells; while nails and hair are formed by materials cast out of cells.

The nerve-cells of the brain (of which there may be over 200 millions in the upper brain alone) send out numerous branching *processes*, or projections of their protoplasm, of which some seem to run on into other cells, and some into nerve-fibres. Indeed, the central axes of nerve-fibres appear to be but prolongations of the protoplasm of the brain cells project-

ed outwards, like long arms or feelers, all through the body. Clusters of cells connected together by their branches in the brain, cord and organs of sense, are spoken of as *ganglia*.

The branching processes of the brain cells, however, are very minute and difficult to trace. It has been commonly assumed that those of adjacent cells are (some of them at least) continuous with one another, making the grey substance to be a net-work of cells and fibres, so that nerve-forces spread from cell to cell by continuity of their substance. But many now think that they are not continuous, that each cell is an independent organism, and that they communicate only by contact, or by proximity merely. During mental activity, they think, the cells extend their branches like feelers, so that they come into contact and communicate in that way. When activity abates, the branches shrink and contract, and communication ceases, and this is the cause of sleep. Brain cells thus considered as independent organisms, communicating but not connected, are spoken of as *neurons*.

The above 'neuronic' theory of brain cells seems to accord with the older cell-theory of life, which affirms that each cell is a living organism by itself, and that the collective life of the whole organism, plant or animal, is a resultant or product arising in some way from the amalgamation or interaction of the lives of the separate cells. This concentration of life is imperfect in plants and the lower animals (parts of which when separated from the rest grow into complete organisms), but is rendered more perfect in the higher animals and man by means of the nervous system and brain—the function of which is to concentrate and co-ordinate the life of the different cells and organs. According to this view, the lives of the separate cells are logically anterior to the life of the whole. The converse, however, is more probably the truth, *viz.*, that is the life of the whole that evolves and gives connection and life to the separate cells, making them its instruments, and realising its own life in and through that of the many units. If this be the case, the life of the whole will be logically anterior to that of the individual cells.

But it is
doubtful
whether their
branches
run into
one another,
or communi-
cate by con-
tact.

Every cell
thought to be
a living crea-
ture,

And the one
life of the
whole, to
result from
the many
lives of the
cells.

The nerve
centres which
regulate the
working of
body include:

§ 20.

II. Next as to the parts, the *ganglia* and systems of *ganglia*, composing the cerebro-spinal axis.—There are two principal parts—the spinal cord, and the *encephalon* or *brain* proper; of which the latter, though by far the larger and more important in man, would yet appear, from the manner of its development, to be but a prolongation and enlargement of the former,

The spinal cord, which is the principal regulating organ of lowest vertebrates,

1. The *spinal cord* or marrow is composed of a grey central core of nerve-cells, receiving and sending out nerve-fibres; and a thick outer layer of white matter, which it found to be composed of the nerve-threads which enter the spine from the body, and, protected by the vertebræ, ascend the spine to the brain. In the lowest vertebrate animals the brain proper is wanting, or minute and undeveloped; and the work of life is kept up by the ganglia or clusters of cells contained in the cord. And even in creatures of much higher rank, *e.g.*, frogs, the work of life can be kept up by the cord for a long time after communication with the brain has been cut off; and there is reason to believe that the ganglia of the cord retain their life for some time after those of the encephalon are dead.

With its adjunct, the sympathetic system;

Outside the back bone, but running parallel with the cord inside, are two rows of ganglia connected by fibres, forming what is called the *sympathetic system*, from which the nerves proceed which control the heart, arteries and organs of secretion. But though outside the spine, the sympathetic ganglia are connected everywhere by nerves with the cord within, and through it with the upper brain. It is through them that cord and brain control circulation and secretion, so that their processes are affected by every feeling that passes through the mind.

And the brain, which includes:

The medulla oblongata,

The cerebellum,

The corpora quadrigemina.

2. The ascending cord or stem enters the skull-bone by a hole beneath, and expands into the *encephalon* or *brain*, which comprises several parts. Thus—

(1) The stem or cord, after entering the head, thickens for some distance, and is here known as the *medulla oblongata*, or prolongation of the marrow, sending out the nerves which supply the face.

(2) Next at the bottom of the brain (and clasping the ascending stem from behind by the band of nerve-threads called the *pons* or bridge) is the *cerebellum*, or little brain—a two lobed body, containing in its centre a dense mass of white nerve-fibres from the stem, which spread out like the branches of a tree (called fancifully 'the tree of life'); and enter into a layer of grey cells which forms the outer covering of the whole organ, and has its surface in horizontal folds or wrinkles.

(3) Above the cerebellum, the ascending stem has upon it four small ridges called the *corpora quadrigemina*, or fourfold bodies, and between them, a small projection called the *pineal*

(or cone-shaped) gland. Above this the stem forks into two branches, and each of these two branches passes through two small bodies called the 'lesser grey centres,' *viz.*—

(i) The *thalami optici*, or 'chambers of vision' (one on each of the ascending branches), so called because they receive the optic nerves, and were at one time thought to be the organs of sight;

(ii) And above, and somewhat overlapping the *thalami*—the *corpora striata*, or 'striped bodies' (one on each side), to which important functions have been ascribed. After passing through these, the ascending branches of the stem spread out, and enter into—

(4) The *hemispheres of the cerebrum*, or upper brain—the two large lobes covered with grey matter which line the sides, top, and back of the head, overlapping the cerebellum, and enclosing the lesser centres and the branching stem between them. The cortex or outer covering of grey substance is in most parts about $\frac{1}{8}$ th inch thick, and is composed mainly of masses of cells, connected with one another by their branches, and embedded in a comparatively structureless, semi-liquid material called the *neuroglia*, which is not known to have any other function than that of supporting the cells and their branching fibres.

The *cerebral cortex*, or outer layer of the hemispheres, in the higher animals, and still more in man, is convoluted, furrowed and folded in a peculiar way; and the size of the hemispheres, and the number of these cortical convolutions appear to have some relation to intelligence, because the greater the surface, the greater the number of cortical nerve-cells. And it is the greater number of the folds, even more than greater size, that distinguishes the human cerebrum from that of animals, and the higher animals from the lower. The two hemispheres are connected with each other not only by the ascending branches of the stem, but also by masses of nerve-fibres running horizontally from side to side, called commissural or connective nerves.

It is to be observed that all the parts of the brain are double—consisting either of two separate bodies as in the case of the lesser centres, or of two lobes as in that of the cerebellum and cerebrum. And it is peculiar that the ascending nerve-fibres undergo *decussation* on the

The two
thalami, and

Two "striped
bodies";

And highest
of all, the
cerebrum,
composed of
two hemi-
spheres;

Each consis-
ting exter-
nally of a
corrugated
layer of cells
called the
cortex,

Deeply folded
and furrowed
in man.

In fact all
the centres
are double
and their
nerves decus-
sated.

way, *i.e.*, they cross each other from left to right, and from right to left, so that the right side of the body is controlled by the left side of the brain, and the left side by the right.

§ 21.

C. The Functions of the different Organs.

As to the functions of fibres and cells :—

The white fibres, are merely lines of communication carrying influences outwards and inwards.

The cells are in some sense the organs of sensation and volition,

And they are the centres which receive influences from without,

Next we may consider what is known regarding the functions of the different *materials*, and of the different *organs* or *ganglia*, composing the nervous system.

I. As to the general functions of the materials : and

• (a) First as to those of the *nerve fibres* which make up the white material—there can be no doubt that the fibres are merely conductors of influence between the central ganglia or clusters of cells, and the rest of the body. The influence which runs along the axis of the nerve-fibre is not really a current, but rather a tremor or vibration of the constituent molecules, and has been compared with the electric current : but differs in being slow in comparison, (the speed of the nerve-current being only about 111 feet per second, while that of an electric current in a copper wire has been estimated at 200000), and in causing consumption of the conducting material. For the nerves, it is well-known, are worn and exhausted by mental work, and require to be continually renewed from the materials of the blood.

(b) As to those of the *nerve cells* or *neurons*, composing the grey material the following facts have been established : The cells or neurous composing the grey masses of the brain are the centres to which the forces of the external world have to be concentrated by in-carrying nerves before the mind can become conscious of them ; and also the centres in which the thinking mind generates its voluntary energies and from which it projects them by out-carrying nerves to move the limbs and produce changes in things. In other words :

(i) The ganglia of the cerebro-spinal axis include the *sensory centres* to which all the in-carrying nerves of the body converge, and to which accordingly the forces acting on the organism from the external world have to be transmitted, before they can be diffused through the organism as a whole, and before they can produce any effect in consciousness, and give rise to processes of sensation, thinking and understanding.

(ii) They include the *motor* centres from which all the out-carrying nerves *diverge*, and are the means of generating and discharging currents of nerve-force by these nerves. It is found that when currents pass through clusters of cells, they are delayed in transmission, but issue from the other side with increased force, showing that new force has been generated in the cells. And when we put forth effort to move our limbs, the force which flows along the nerve-fibres, and set the muscle-machinery in motion, is originated in, and discharged from the cells of the *motor* centres. Hence the working of the cells, or of some of them, must be directly connected with the processes of *sensation, thought and volition*, which are the mental sources of action, and direct the outflow of energy into the limbs so as to react on the external world.

The force, which is thus discharged from motor centres along out-carrying nerves does not, of course, originate from nothing, but is evolved by transformation of the materials—probably the protoplasmic contents—of the cells, which require to be constantly replenished from the blood. The need of oxygen, and the evolution of heat which takes place in all mental work and effort indicate that the physical force accompanying it is evolved by a process of oxidation or combustion. This combustion of nerve-substance in brain-cells is, to all appearance, the source of the force which flows along the nerves, and excites further oxidation and contraction of the muscle-fibres, and thereby motion of the limbs.

(iii) That they are the means of directing the nerve-forces which they originate *into the right channels*—i.e., the right lines of nerve-fibre to reach the right muscles and limbs, and produce the right movements. This, also shows that the processes of the cells are in direct correspondence with the mental processes of *sensation, thinking* and *desire* which guide and regulate our actions. For a current, once originated, would naturally have a tendency to *diffuse* itself along fibres in all directions; but the cells which originate it have also the property of inhibiting such diffusion, and directing it along the right fibres, in obedience to the guiding idea and desire.

In the case of the simpler and commoner movements indeed, such as those of organic life, (i. e., of circulation, digestion, secretion, respiration and automatic and habitual actions), this direction of force takes place automatically and unconsciously; but in more complex ones which are under the

And dis-charge in-fluences from within;

(Their en-ergy being derived by oxidation of materials from the blood),

And also direct outgo-ing influences into the right channels to produce the right move-ments,

Whether automatically or consci-ously;

command of will, it supposes the presence of guiding ideas and thought. Hence, in such cases, the working of the cells must be directly connected with thought. And finally—

And the cells of the higher centres restrain and regulate the working of the lower.

(iv) That the cells of the higher ganglia (in man, those of the cortex of the hemispheres) are not only the means of originating, directing, and regulating action of their own (voluntary action) in direct correspondence with thought and will, but also of *restraining* and co-ordinating that of the lower ganglia (*viz.*, the lesser centres, cerebellum, medulla and cord), and restricting them to action of the right kind and degree, in obedience to thought and will—any loss of co-ordination among the various ganglia, and of subordination of lower to higher, entailing disorder both bodily and mental. This fact also tends to show that the cerebral cells are the parts of the organism which are in most direct correlation with mental processes—“the bodily seat of mind,” if such a phrase be legitimate.

Thus, in the healthy system, the higher central ganglia keep the action of the lower in harmony with thought and will. In mental disorder, this control is more or less interrupted, and the automatic and disorderly action of the lower ganglia seems to control thought and will, instead of being controlled by them.

Thus physiologists speak of *sensory* centres in the cerebrum, meaning those parts to which the in-carrying nerves converge, bringing influences from the organs of sense and, through these, from the external world, giving rise to sensations of pressure, heat and cold, light and dark, weight, colour, sound, taste and smell (which reveal to us to existence and qualities of external things). And they speak of *motor* centres, meaning those parts in which motor nerves take their rise, and in which (presumably) those currents are generated which flow outwards by out-carrying nerves and produce movements of the limbs. They sometimes speak also of *thought* centres, supposing that there is a particular part of the brain where the processes of the cells correspond to the mental process of understanding, remembering, imagining and reasoning. It is more probable however that thought involves the co-operation of all parts of the brain, and is therefore without any special centre.

These facts prove that the cerebral cells are the part of the body in most direct correlation with mind.

From the above facts we must draw the conclusion that the cells of the cerebral hemispheres are the parts of the organism most closely connected both with sensation, thought and emotion which result from impressions made on the organism of sense by external things, and with volition which prompts and directs the reactions of the organism on external things. In

other words, they are the parts of the organism which have the best claim to be considered the "seat of mind."

§ 22.

II. As to the *special functions* of the *different ganglia* or nerve-centres (bodies composed chiefly of nerve-cells)—vivisectional experiments on animals prove at least this much:—

As to the functions of the different ganglia:—

(1) The grey cellular substance of the *cord* is concerned in keeping up the purely automatic processes of organic life—those of circulation, digestion, respiration, and the like; for these functions continue in animals after communication with the higher ganglia has been cut off.

Those of the cord;

(2) The *cerebellum* is concerned with the co-ordination and adjustment of the movements of the muscles and limbs of different sides of the body. For, when this organ is removed, an animal can still move its limbs in a random way, but cannot make them work in harmony, so as to walk, swim, or fly.

Those of the cerebellum;

In man, it regulates also those movements which have first been learnt by exercise of thought, but have become *secondarily automatic* by habit, so as to be performed almost without conscious effort, such as walking, writing, speaking. These are not instinctive like the actions of animals, but have to be learnt by exercise of the higher organs of thought; but having once been learnt, they are relegated to this lower organ, leaving the higher ones free for other work.

Those of the lesser centres;

The special functions of the lesser grey centres are still uncertain. The 'optic thalami,' which are greatly developed in birds, have been thought to have something to do with vision, and the regulation of the eyes; or with turning incoming currents from the body into the right parts of the cerebrum to produce sensation. The 'striped bodies' have been supposed to have something to do with turning motor currents from the cerebrum into the right channels to reach the right muscles, and produce the right movements.

(3) But the *cerebral hemispheres* are, in man at least, the only parts in *direct* correspondence with the processes of consciousness. Incoming currents must reach, and set up processes in the ganglionic cells of these higher centres, before processes of *sensation* can arise in the mind. *Volition* must occasion processes in the hemispheres, and outgoing currents from them, before it can move the limbs. The processes of *thinking* and

Those of the cerebrum, the part in closest correlation with mind—the so-called seat of sensation, thought and volition.

Containing
the sensory
and motor
centres,

So that
control of
body is more
centralised
in man than
in lower
animals.

Some have
supposed
that parti-
cular mental
functions
must have
their seat in
particular
folds of the
cortex.

But this
much only
has been
proved—

That sensa-
tions are
specially
connected
with pos-
terior parts,

And activi-
ties with an-
terior parts
of cerebrum,

The relation
between
brain and
abstract
thought be-
ing still un-
certain.

feeling, also, which intervene between sensation and volition, correspond, we knew, to processes going on in the cerebrum. The working of the lower ganglia is subservient to that of these higher ones. The cerebral ganglia must therefore be regarded as in a certain sense the "organ of mind"—the 'seat' of thinking, feeling, and willing—containing the so-called 'sensory centres,' 'thought centres,' and 'motor centres.'

Even a frog or a pigeon when its hemispheres have been removed, though it continues for a time to live and move, moves in an entirely mechanical way in obedience to stimuli from outside, without any trace of mental guidance from within. And in man we know that the centralisation of vital and mental powers is much more complete than in the lower animals; so that there is every reason to believe that in man, still more than in animals, "the physical basis of consciousness is mainly or wholly the convoluted cortex of the cerebrum."

But the attempts which have often been made to localise particular mental states and processes in particular convolutions of the cerebrum—to find a particular seat for colour, sound, memory, hope, fear, envy, ambition and the like—have not been successful. The extent to which all the mental activities are dependent on, and involved in one another—willing in feeling, feeling in thinking, thinking in sensation, and so on—seems to put all local separation of seat out of the question. Rather the whole cerebrum if we should not say rather the whole organism of which the cerebrum is only the highest centre of co-ordination, must be concerned in the support of every state of consciousness. There is some evidence, however, that—

(1) The posterior parts are specially concerned in the *passive* states of mind, or those occasioned by influences from the outside and incoming currents, such as sensation; and there are particular parts that seem to be specially concerned with particular sensations, as colour, taste, smell, though these parts have no definite boundaries, but shade into one another gradually. These will be the sensory centres.

(2) And that the anterior and lateral parts are more directly connected with the *activities* of the mind, as willing, effort, and movement; and the parts from which the motor currents flow, which move the different limbs and organs, have been determined and mapped out on the front and sides with considerable certainty. These will be the motor centres.

And some think that as thought intervenes between sensation and volition, it must therefore be connected specially with the middle parts of the cerebrum; but this is not proved.

Hence all that has really been determined with regard to the localisation of particular mental functions in the cerebrum amounts only to this: There are certain parts through which forces from without affect the mind and occasion sensations; and there are certain areas through which mind reacts by occasioning outgoing currents of energy along efferent nerves to move the limbs. Hence, when a particular set of muscles are paralyzed or disordered in their contractions, it can be known for certain that a particular area of the cortex is diseased or injured.

We often fall into the mistake, however, of speaking of brain as if it were itself all the organization which is needed for the purposes of mind, and as if consciousness were a consciousness of brain-cells and fibres, and the rest of the body had nothing to do with mind. But what really corresponds to consciousness is the moving equilibrium of the forces of the whole organism which are continually flowing to and from the co-ordinating centre. The cerebrum is this centre; and consciousness is the awareness of the continual flux and reflux, adjustment and re-adjustment of the forces of the organism as a whole, and not an awareness of brain states merely. Strictly speaking, therefore, the whole organism and not the brain is the seat of mind.

But the direct physical concomitant of mind is really the ebb and flow of force through the whole body, as focussed in the brain.

§ 23

D. *The System as a whole.*

We can now understand somewhat *the working of the nervous system* as a whole. We now see that external forces acting on the surface of the body and organs of sense, affect the ends of the sensory nerves contained in them (the protoplasmic cells which they seem always to have at their outer, as well as at their inner extremities). This external stimulation produces an inward current which when it reaches the cerebrum, sets up first those processes as the central cells which are the physical concomitants of *sensation* (the sensory centres); and then, which accompany *thought* and *emotion* which rise out of sensation. And, as we never think or feel without also reacting some way on the world which occasions our thought, therefore the processes accompanying thought and feeling are always passing over into those which accompany *effort and volition* (the motor centres); and these, again, into the outgoing motor currents which enter into the muscles, and there set up alternate contractions, and move the limbs. Limb movements, again, in walking or

The working of the nervous system as a whole :—

External impressions—
inward currents—process of centres—
outward currents—
contractions of muscles,

Corresponding to *sensation*, *thought*, *emotion*, and *conation* ;

working are always producing changes in external things or our position in relation to them, and thereby changing the external forces acting on the sense-organs, and thereby the sensations themselves, and thereby thought and feeling and so on.

Currents through cerebrum being accompanied by sensation, thought and volition,

Thus, passing through the cerebrum, there is an almost continuous *circuit of influence* flowing from without inwards, and from within outwards—from external things through the sense-organs to the centres of sensation, thought and feeling; and from these again, through motor centres and muscular contractions, to external things; and those currents which come into immediate correspondence with thought must pass through the higher centres, *viz.*, the hemispheres.

Thus when there is a tree before us bearing fruit, the shape, colour and smell of the tree and fruit cause processes in our eyes and nostrils. These changes in the sense-organs produce ingoing currents of nerve-force to the sensory centres of the cerebrum. There they give rise to sensations of colour (*viz.*, of the bark, leaves, flowers and fruit), of shape and of smell. These sensations give rise to processes of thinking; we understand that this is a tree of such and such a kind, bearing fruit of such and such a quality. The thought gives rise perhaps to desire, and the desire rises into will to approach the tree and pluck the fruit. The act of will gives rise to processes in the motor centres, by which energy is generated (through oxidation of cell-substance) and projected along outgoing nerves to the limbs, setting them in motion. The action of limbs brings the fruit to the lips, and produces new sensations, *viz.*, of taste and flavour, and new thoughts and volitions, and so on.

Subconscious automatic and organic activities passing through only the cerebellum and cord.

But those currents which have become *secondarily automatic* by repetition and habit, such as walking and speaking, seem to rise no higher than the cerebellum and lesser centres (though still subject to inhibitive and regulative influence of the cerebrum). Those which have been purely *automatic* from the beginning, *viz.*, the processes of organic life (as of circulation, digestion, secretion, respiration), seem to rise no higher than the ganglia of the cord and sympathetic system.

Hence three circles of influence.

Hence we may distinguish three circuits of force passing through the nerve-centres, and corresponding to different phases or stages of life and mind:—(1) the circle of *reflex* and purely *automatic* action, vital without being mental, passing through the cord; (2) that of acquired *habitual* or *customary* actions, which began as mental but have almost,

ceased to be such, passing through the cerebellum ; and (3) that of conscious *sensation, thought and volition*, passing through the cerebrum—the last corresponding, therefore, to mind proper.

The principle of the correlation or concomitance of mental and organic processes in the working of the brain and nervous system has an important practical bearing on the conduct of life with a view to the preservation of mental and bodily health. Health and energy of mind will suppose health and energy of organism, and more especially of the nervous system ; and anything tending to impair the one kind of activity will thereby impair the other also. Hence it follows that—

1. Mental excitement and strain may be carried so far that the corresponding physical strain will cause injury to the physical organs concerned, which may be more or less permanent, and impair future mental operations. Hence the effect of mental overwork and excitement in impairing the physical system, and through that the mind itself, even to the extent of mental derangement.

2. On the other hand, external conditions tending to impair the healthy working of the physical system will thereby impair the working of mind also, e.g., insufficient nutrition, impure air, stimulants and narcotics—the last two being frequent sources of physical, and thereby of mental derangement.

3. But the principle of the *localization* of particular mental functions in particular parts of the cerebrum, if established, would suggest, it has been remarked, a way in which the danger of continuous mental labour might be greatly lessened. If a particular kind of mental work affects mainly a particular department of the brain, then, even when this department is exhausted, the others will remain comparatively fresh. Hence by passing from one kind of mental work to another, the different departments may be exercised in succession without injurious effects to any of them.

This is confirmed, to some extent at least, by the feeling of relief which every one experiences in passing from one kind of mental work to another, e.g., from reading mathematics or philosophy to reading history. This relief may be owing more, indeed, to the fact that the latter study involves less mental exertion, than that it exercises a different region of the brain. Still there may be a difference of region to some extent in this sense, viz., that the *concrete* ideas of history may involve either a wider or a narrower circle than the *abstract* ones of the former studies. But thought itself is everywhere essentially the same, so that the circles connected with different kinds of thought, abstract and concrete, must, for a large part of their area, coincide.

And hence there will be a correspondence between mental and bodily health and vigour,

And an influence of mental work on bodily,

And of bodily on mental.

And hence the advantage of variety of activities,

And relief experienced in change.

§ 24.

Finally, as to the *concomitance* of mental and physical:

But in what does the correspondence between mental states and bodily states consist?

If we are to assume the law of *correlation* or *concomitance* (as most psychologists do) between the two series of mental and physical processes, we have to consider the question: *In what does this correspondence or parallelism consist?* or what corresponds to what? In other words, in what respects do the successive facts of the mental series correspond to those of the bodily series? This, to be sure, is a question which belongs to metaphysic as much as to psychology; but still, if the psychologist is to assume the principle, he is bound to give a definite meaning to it. In the first place it cannot be a correspondence of *kind* or *resemblance*. We cannot suppose that our sensations and ideas (constructed out of the revived sensations) *resemble* in kind either the corresponding brain processes, or the extra-organic thing which causes them. The brain processes are always an agitation of molecules, cells, and fibres, undergoing decomposition and recombination—processes of tension and motion due to chemical and mechanical forces, working in or on the molecules. But the corresponding mental process, the sensation, feeling or idea, has no resemblance of kind to impacts and movements, or to integrations and dis-integrations of molecules.

Do sensations really resemble brain states?

Do ideas really resemble external things?

The answers given to these questions mark the differences between realistic and idealistic psychology.

Still less can they have any resemblance to the external causes of the brain processes. The pain which makes us aware of a cut or bruise has no resemblance to the lacerated muscle-fibres and quivering nerves which cause it. Our sensation of light has no community of kind with the vibrations of the ether which convey it, nor with the molecular constitution of the object which reflects it, and which we call whiteness.

The older psychologists, such as Locke, admitted that in the case of the *secondary* qualities such as colour, sound, taste, temperature, our ideas have no resemblance of kind to their external ground; but held that, in the case of the *primary* ones, such as extension, form, solidity, our ideas are, in some sense, copies of things, as pictures are of their originals. But this would apparently imply that ideas themselves are extended, round or square, hard or soft, and so on. And a more exact analysis shows that ideas of extension, form, and the like, are themselves formed by abstraction and mental con-

struction from sensations (*viz.*, of movement and resistance), and do not differ in their composition from ideas of secondary qualities (though they differ greatly in their meaning). In fine (if we assume the usual view of the nature of external things) we cannot say that our ideas of things resemble things (whether brain-processes or their external causes) more perhaps than the sounds of a speaker's voice resemble the ideas in his mind, or than printed letters resemble the sounds of the words.

But the correspondence is—

(i) In the first place, a correspondence of *change* and *relation*.—The circuit of mental phases corresponds in order to the circuit of bodily changes, every step of the one to a step of the other. Thus, the physical series begins with a current of force from without, forcing itself into the organs and brain; and this force from without gives rise to a succession of complicate processes in the fibres and cells of the higher centres; and the accumulated force of these finds vent at last in outgoing currents and movements of the limbs. So also the mental circuit begins with sensations, which force themselves, so to speak, into consciousness; and there give rise to complicate trains of thoughts and emotions: and these finally culminate in volition and effort, which result in outgoing currents and physical movements. Thus physiologists speak of sensory centres and motor centres, and sometimes of thought centres, meaning regions of the cerebrum where physiological processes correspond to the mental processes of sensation, thought and movement.

(ii) It is a correspondence of *degree*.—Mental states such as sensations, ideas, emotions, have different degrees of quantity or intensity; and their intensity rises and falls proportionately to that of the corresponding physical processes.

Is the proportion of increase and decrease, then, a direct one? In the case of sensations occasioned by extra-mental forces acting on the organism from without, there are two relations to be considered—the indirect relation of the sensation to the extra-organic stimulating force, and its more immediate relation to the accompanying brain-process, which that force causes. (1) In comparison with the extra-organic stimulus, it is known that the mental process increases and diminishes more slowly; for it is found that the stimulus has to be increased in a geometrical ratio in order to increase the sensation in an arithmetical one (Weber's Law). (2) But in

But this
much is
admitted
by all :—

When there
are mental
changes there
are at the
same time
bodily
changes :

And mental
and bodily
changes
correspond in
quantity, or
degree,

Though not
directly,

the case of the innermost brain processes, it is possible that the intensity of the consciousness may rise and fall in the same ratio. But this is an unsettled question.

And though the one kind of activity cannot be regarded as a transformation of the other,

Yet mental and organic processes increase in complexity proportionately.

And correspond in health and disease,

And in the aptitudes for work which we call habits.

And complexity of mental powers and complexity of

With this is connected the question: Whence does the energy of mental work come? It cannot spring out of nothing. Is it produced by transformation of physical brain energy? as one physical force is transformed into another, e. g., chemical contraction or repulsion into heat, heat into motion of mass, and so on. If so, there would be a decrease in the quantity of brain-work while thought is going on; because part of it would be transformed into thought-work. It is now generally admitted, however, that there is no disappearance of physical energy in any form from the brain in thought, but rather an increase; so that thought-energy, it is commonly believed, cannot be a transformation of physical.

(iii) Again, it is a correspondence in *growth and development*, and in *health and disease*.—The growth of the mental functions in complexity and efficiency advances *pari passu* with the advance of the nervous system in the complexity of its parts, and of the processes which they perform. And disorder or decay of the cells and ganglia and their lines of communication with one another and with the rest of the body is accompanied by disorder or decay of the mental powers.

The brain seems to attain its full bulk about the age of seven or ten; but the number of its cells goes on increasing, and communication between them goes on improving by multiplication of connecting fibres, and the different ganglia or groups of cells go on becoming more and more clearly differentiated (implying greater division of labour, and therefore more efficient performance of work) until late in life. And this multiplication and improved connection of cells is accompanied by increased complexity of ideas and intellectual operations, of emotions, and powers and habits of action.

Thus the powers of performing complicate series of actions unconsciously or nearly so, which we acquire by practice, and call *habits*, must be owing to the formation of tracks of communication between certain groups of cells and certain lines of outgoing nerves; such that currents, which at first required the guidance of conscious will, now flow through these channels spontaneously, leaving consciousness free for new and higher work.

(iv) And finally, there is a correspondence also in *inheritance*.—For in proportion as the power and tendency to perform one of the two parallel series (physiological and mental)

is inherited, the other will be inherited also. The power of performing, and tendency to perform the physical series goes along with the structure of the brain, nerves, and muscles. Now the physical structure is largely inherited from ancestry. We may expect, therefore, that along with this, the power and tendency will be inherited of performing the mental series also. Hence the intellectual powers and emotional temperament of the mind must be, to some extent, inherited, innate, or intuitive. Yet it is evident that we do not derive from our ancestors all our mental powers and activities; and it is impossible to determine where the effects of inheritance end and those of acquisition begin, and how much is due to the one, and how much to the other. And it remains a disputed question how much of our character is inherited from our ancestors, and how much is acquired by ourselves in our own life time.

For powers and tendencies may be innate though they do not manifest themselves at birth. The development of brain is not complete at birth, but goes on for many years, in obedience to inherited tendencies present from birth: and as brain-structure, and the power and tendency to physical action go on developing in after-life from inherited tendencies, so the mental powers and tendencies go on developing also; and thus mental powers inherited from ancestors may not really manifest themselves until late in life.

Thus the physiological department of psychology deals with those physiological processes (and their organs) which are in most direct correspondence with mental processes. Nevertheless psychology proper is more directly concerned with the mental series itself—with the feelings, thoughts and volitions which make up the so-called stream of consciousness and constitute mind in the empirical sense, and with the consciousness of self, or of the essential unity pervading and connecting these successive states. Hence the mental series itself has next to be considered.

organic processes are inherited together.

Though it is an unsettled question how much is really due to inheritance.

But psychology is more directly concerned with the mental than with the physiological.

V.

§ 25.

THE ESSENCE OF MIND.

What is it that makes mind to be mind, or distinguishes that which is mental from that which is non-mental?

The differentiating attribute which makes mind to be mind is consciousness, or the power of becoming conscious—

Consciousness of its own changes of state—

And consciousness of itself as having them and of something other than self as occasioning them.

Mind is something which acts, and passes through successive states and processes, and is at the same time *aware* of its acts and states. The awareness of its acts and states is what we call *consciousness*, and this power of becoming conscious of its own states and activities is what distinguishes mind from what is not mind. Other things act and react and pass through changes of state, but are not conscious of their actions and states. Consciousness therefore (or at least the *potency* of consciousness) may be said to be the *essence*, *primary quality*, and *differential characteristic* of mind—that which makes mind to be mind, and without which it would not be such. And in being conscious of its own states and processes, it manifests and reveals itself to itself and thereby becomes, at the same time, *conscious of itself* as the *subject* of these states and processes, *i. e.*, becomes not only *conscious*, but *self-conscious*. And in being conscious of itself, it may be said to exist *for itself*, *i. e.*, to become relatively self-contained, self-sufficient individual reality. Things which are not aware of themselves, exist for other things, not for themselves, and therefore belong to a lower stage of existence. Mind in becoming conscious of itself evidently attained to the most complete and perfect kind of existence, *viz.*, by becoming relatively self-contained, independent and individual, aware of itself, an end to itself and not merely a means to other things—in other words, a personal being.

Thus the sun shines equally upon the rock and upon the man standing beside it; and the physical and chemical effects produced by light and heat are essentially the same in both. But there is this essential difference, that the man, besides being affected physically by the solar forces, has the power of reacting upon these affections, and transforming them into sensations of heat and light, *i. e.*, into terms of consciousness, thereby becoming conscious of the states thus produced in him as states of himself, and conscious of himself as having these states.

Hence mind may be said to contain these component factors : (1) it is the *subject* which *has* certain states and *performs* certain activities ; (2) it is *conscious*, or has the power of rising into consciousness, of its own states and activities ; (3) and in so doing it becomes conscious of *itself* as subject of them thereby realising itself as individual personal reality.

And as the activity of finite mind must be *reciprocal* activity, or *interaction* with a world of finite things outside of itself, mind may therefore be said to live in an inner circle in the midst of an outer circle—the inner circle being its own conscious states and activities, and the outer circle, the world of external things, or nature. The *inner circle* is composed of sensations, ideas, feelings and volitions—the modes of consciousness in which mind realises itself as mind and becomes conscious of itself, and which is the province of mental science. The *outer circle* is conceived as made up of material molecules and aggregates of molecules occupying and moving about in space, and is the province of physical science. As consciousness is the differentiating characteristic of mind, so motion and extension in space is conceived as that of the external world.

Hence mind must be understood as the subject which feels and thinks, and is aware of itself as feeling and thinking—in contrast with the external world, or that which is extended in space and is the object of thought—that which is thought about, but does not think. Thus the subject living within the *inner circle* of its own consciousness—its own sensations, ideas and feelings—can know the *outer circle* of moving and extended things (external nature) only through the medium of, and in terms of, certain of its own states of consciousness. It can know the outer world only in so far as it feels itself *affected* by it ; and therefore only as the *external* ground of certain *internal* affections or states of its own. And the states in which it is conscious of itself as affected from without, are its *sensations*. (In other words, it can know external things only in their phenomena or effects ; and the effects through which it knows them are the sensations impressed upon it by the things). And it will be the business of the psychology of cognitions to explain how, from sensations within our mind, we arrive at the understanding of, and belief in a world of things in space outside and independent of our mind. Hence

Hence mind involves a subject that is conscious and self-conscious,

And implies a world beyond itself as the occasion of its states and activities.

And knows the outer world through the medium of its own affections,

Or the ways in which it feels itself affected by the world.

§ 26.

Empirical and metaphysical aspects of mind.

But mind
may be
regarded
from two
points of
view :

It follows that there are *two aspects* under which mind may be regarded—*viz.*, as the series of conscious states, activities, and products in which it manifests its own existence to itself and others; and as the reality or substance which underlies and manifests itself in these phenomena of experience. In other words, it may be regarded from the *experiential* and the *metaphysical* points of view—we may think of the actual contents of conscious experience, or of their metaphysical implications, (*i. e.* of what is implied in experience as to what is beyond experience). Thus—

(A)
As the series
or aggregate
of states and
activities en-
tering into
conscious ex-
perience;

(A) *Empirical*: Mind may be regarded from the side of *conscious experience*—the aspect under which it is regarded by *empirical psychology*. How then does mind appear to itself in conscious experience? It appears as (*a*) a series of states and activities of feeling, thinking, and willing, in numerable forms and with innumerable products—sensations occasioned from without and giving rise to ideas, ideas giving rise to feelings and feelings again to desires and volitions, and these to social institutions, works of art, literature, science, religion; and (*b*) something which is the common subject of these states, and wills these activities and products, and gives unity and connection to these phenomena, and which we call our essential *Self, I, or Ego*.

And this is
the aspect
under which
it is regarded
by experien-
tial psycho-
logy.

And the
study of it is
the work
under.

These changing states, acts and products, together with the self as subject which experiences them, make up the experience, or conscious life of mind. But empirical psychology, as now commonly understood, avoids the question of the essential self (either holding 'self' to be merely another name for the sum-total of connected conscious states, or referring the question of self to metaphysic); and treats mind as merely the series of conscious states, past, present and future; and undertakes to deal with these as the natural sciences deal with the phenomena of mechanics, electricity, heat, chemical composition, and the like, *viz.*, by observation and experiment, analysis, and inductive

inference from particular facts to general conclusions. In other words, it undertakes to discriminate their differences of kind and degree, analyse compounds into their elements, discover the laws and conditions according to which they succeed one another in time, and combine with one another into compounds and aggregates. Such *empirical* study is indispensable, because it is necessary to understand the outward manifestations, *viz.*, the thinking, feeling, and willing, before anything can be understood regarding the reality which manifests itself in them, *viz.*, that which thinks, feels, and wills, (beyond the mere fact of its existence).

To most psychologists hitherto, however, the study of the phenomena of mind—thinking, feeling and willing—has derived its chief interest from the light which it casts on the essential reality underlying the phenomena, *viz.* . . . or something which thinks, feels and wills. But thinkers allowed foregone assumptions regarding mind as soul (or mental principle) to warp too often their judgment with regard to the meaning and contents of the phenomena, and this made an accurate science of psychology impossible. Hence, since Hume exposed these assumptions, many have resolved not only to reject ill-founded assumptions, but to exclude all metaphysical reasoning and conclusions, and limit psychology proper wholly to an analysis of the phenomena of experience.

And some have gone so far as to deny the truth of our apparent consciousness of a permanent self which thinks, feels, and wills, making the so-called *substantial self* or soul to be but an abstract idea fallaciously substantialised and thought of as reality. Mind is just what enters into conscious experience and nothing more, and what does so, is only the series of conscious states and nothing more. The self which experiences the states does not itself enter into experience. Mind therefore is really nothing more than the series of sensations, feelings, and ideas themselves—"a series which knows itself as past and present." These sensations, ideas, and feelings by themselves constitute the reality of mind as mind, and it has no other. There is, therefore, really no metaphysic of mind.

This was given as a possible account of mind by Hume (writing with a sceptical motive merely, *i. e.*, a desire of suggesting the doubts and difficulties surrounding the question, without asserting anything in earnest), and has been repeated by Mill (though with the admission that it is a "paradox"); but it has been taken up in earnest by some later writers, who think that all reference to a reality or substance behind the phenomena of mind is groundless. Theirs may be called a *sensationist* account of mind, because it makes mind, to consist essentially in sensations—original, and revived and

taken by psychology as science in the common sense of the word;

Which has a tendency to explain away the reality of self or ego, and therefore of soul;

And to say that self is nothing more than the series of states, or stream of consciousness,

As in the sensationist account of Hume and Mill.

recombined in various ways into ideas—and therefore to be a passive product of what is non-mental, and therefore without any independent existence of its own.

But this involves either the fallacy of personifying abstractions, or that of materialism.

But the purely sensationist theory either (i) itself involves the fallacy of substantialising abstractions, by making sensations and feelings (which, apart from the reality that has them, are only abstractions) to be themselves substances (as when Mill speaks of feelings as knowing themselves to be past or present); or (ii) assumes the metaphysical theory of materialism, that matter is the real substance which underlies feeling and thinking; so that there is no mental substance, mind being only the series of sensations and feelings and these being only functions or products of the organized matter of the brain. Hence

§ 27.

(B)
As the substantial reality which reveals itself in the stream of conscious states and activities,

(B) *Metaphysical*: But mind may be regarded also from the side of the *substance or reality* which manifests itself in conscious experience; and from what mind is directly conscious of regarding itself, psychology may study what can be *inferred* regarding mental substance and its relation to other realities. This is the aspect under which it is regarded by *rational psychology*, i.e., *ontology* or *metaphysic* of mind. From this point of view, mind is not merely the series of states of feeling and thinking, but the permanent something which feels, thinks, and wills, and remains the one subject of many successive acts and states. For these, like all other phenomena are phenomena of something—ways in which something shows or manifests itself; and we cannot really think of the manifestations without thinking of that which manifests itself in them. For if we know reality at all, there must be some point at which reality is revealed in consciousness—some point at which consciousness and reality meet—and this can only be in the self which is the subject of consciousness. At this point experiential and metaphysical psychology meet and coincide. The reality of self is the fundamental fact of experience without which no experience would be possible. Experience itself therefore must give the reality of the self.

Or the real something which feels, thinks and wills;

But metaphysic of mind does not stop with experience; we know that conscious experience does not reveal to us the whole inner nature of the mental reality, nor the whole of its outward relations to other realities. What is directly

tells us regarding it, is its existence and its attributes of thinking, feeling and willing, and thus far psychology is experimental and metaphysical at the same time. But consciousness is finite and limited, while the nature and relations of real things extend far beyond the limits of consciousness. Hence thought cannot stop at what is given by immediate experience but must seek in the given phenomena for evidences from which it may reason to *the deeper nature of mind and its relation to other things, and its origin, place and function in the world system*. In dealing with these questions, metaphysic goes beyond experience, and rises into philosophy.

Hence, with regard to mind as substantial reality, two questions have to be considered: What and how much does consciousness *directly reveal* regarding the nature of the conscious subject? or what are we directly conscious of regarding our own self? And what (if not directly given) may be *inferred* from the contents of consciousness regarding it? Hence we may ask first—

(a) What is mind *directly conscious of* regarding its own essential nature? or what and how much does consciousness *directly reveal* regarding the nature of its own conscious subject? or what are the revelations of *self-consciousness*?

The results of such analysis may (as explained above) be considered as common ground to empirical psychology which analyses what is given in experience, and metaphysical psychology which inquires into the essential nature of mind. For it is from the evidences supplied in mind's consciousness of itself, that metaphysic can reason further back to the deeper nature and relations of mind as substance. And this question—what mind is directly conscious of regarding itself—falls to be considered under the head of *self-consciousness*. We may ask further—

(b) What can mind *infer* or know *indirectly* regarding its own essential nature, beyond what is directly revealed in consciousness? Consciousness and self-consciousness reveal certain facts regarding the nature of the self and its working in the world. It is possible by using the facts thus given as premises from which to start, to rise to other truths not directly given, *viz.*, truths regarding the inner nature of the self as reality, and its relation to other realities manifested in nature, and to the absolute power above both self and

And in
dealing with
it under
this aspect
we may
ask—

What are
we directly
conscious
of regarding
our own self,

Which is
analytical
psychology ?

And what is
implied
in our
consciousness
as to our
deeper
nature and
relations,
beyond the
sphere of
conscious-
ness,

nature, and thereby rise to an understanding of the place and function of the self as a factor of the world-system? This form of inquiry will be peculiar to metaphysical psychology.

Which is metaphysical psychology?

This is the proper question therefore of metaphysic of mind as a branch of general philosophy. The principal metaphysical hypotheses as to the nature of mind considered as soul, have already been indicated. But what we have mainly to deal with here is not metaphysical psychology but mind as manifested in conscious experience—on the assumption that the conscious processes can be analysed and understood, at least to some extent, before any theory is formed as to the inner nature of the substance. Hence we have to consider first the nature of consciousness in general, and then, what consciousness reveals directly regarding one's own-self, which is *self-consciousness*.

But the reality of self is given in experience.

NOTE: Nothing has led to so much confusion and failure in recent philosophical writing as the loose use of the word 'experience,' without any attempt to determine what experience is and gives. Generally it is assumed that it gives only sensations and feelings and ideas rising out of them. But the writers are incessantly slipping in surreptitiously the words *I*, *we*, *self*, *subject*, *mind*, denoting something which experiences the sensations and elaborates them into knowledge. Of this something no account is given. Sometimes we are assured that it is mere illusion. But an illusion could not be so necessary to thought as the writers themselves find this idea to be. It must either be a metaphysical idea or a fact of experience. But the writers expressly exclude everything metaphysical, and limit experience to the feelings themselves. It is maintained above, on the contrary that the self is the fundamental fact of experience, without which experience would be impossible.

§ 28.

CONSCIOUSNESS.

As for the nature of consciousness in general:

Having thus indicated the chief questions concerning mind in general, we have next to consider the attribute or primary quality which makes mind to be mind, *viz.*, its attribute of being conscious of its own states and activities. Under this head we may consider first the distinguishing *characteristics* of consciousness or what it is; then the *conditions* on which it depends; then its *contents* (or what it is conscious of), and especially the *objects* or elements of *reality* revealed in it,

What it is.

I. With regard to the nature of consciousness, nothing more can be said than that it is the mind's *property of becoming aware of itself and of its own activities and changing states*, and is what makes mind to be mind, and differentiates it from whatever non-mental forms of being there may be.

Indeed, no strict definition can be given of consciousness, which is not synonymous; because it is an ultimate fact which cannot be brought under any higher genus, and can be known only by being experienced. We may say, indeed, that it is *the self's awareness of itself and its own changing states*, but *being aware* is only a synonym for *being conscious*.

But though it cannot be *defined*, it can be *described* in various ways. Thus it may be described.

(1) By enumerating its *constituent factors or elements*, *i.e.*, the various states and processes which enter into consciousness, such as effort or conation, feeling, and thinking, and explaining their relation to one another; and showing that consciousness is the common essence underlying them all, and that which makes them to be mental (*e.g.*, showing that sensation, perception, memory, reasoning, desiring, willing, however much they may differ from one another *specifically*, are essentially identical in being *conscious* processes, and therefore mental);

(2) By contrasting the mind's essence or differentiating attribute of being conscious with the essence or differentiating attribute of non-mental things, *i. e.*, of the material world. Now the differentiating attribute of the physical world is that it occupies space, so that all its parts have the attribute of being *extended* in, and resisting the motion of other things through space, and can be touched, handled, and measured. We may therefore compare the attribute of being *conscious* which distinguishes mind with that of being *extended* which distinguishes matter.

Thus extension, we can see, necessarily implies a substance which is divisible into parts, each occupying and resisting movement through a definite portion of space, and capable of being moved from one position in space to another; and we can see that all the qualities of such a substance will be

I. It cannot be defined in any strict sense.

But we can describe it by stating its constituents,

And showing that it is the common essence of all mental work, or what makes mind to be mind;

And especially by contrasting it with the attributes of what is not conscious,

As with the corresponding primary qualities of matter, or what makes matter to be matter.

resolvable ultimately into modes of movement and position in space. All this is true of matter.

Consciousness, on the contrary, cannot be conceived as rising in any way out of extension and multiplicity of parts, but rather implies a subject which is indivisible and in some sense above divisible space—a focal point, to speak figuratively, from which conscious activities and products radiate outwards into space. This is true of mind. The mental principle which pictures things as composed of parts outside of one another in space, cannot be itself so pictured. Hence the contrast between mind which has consciousness as its essence, and matter which has extension.

(This suggests, of course, the great problem of the metaphysical school—how two such apparently incommensurable substances, extended and unextended, can interact and thereby correspond with each other as they appear to do.)

§ 29.

Its conditions.

II. Its conditions are

II. We may next consider *the conditions* on which the origin and continuation of consciousness depend, so far as known.

Metaphysical,

(A) These conditions, however, will be partly *metaphysical*—because they will include the nature of the mental principle as substantial reality, and its relation to other realities, *viz.*, to nature and to the absolute; and these questions are the subjects of metaphysic, and philosophy, and are therefore passed over in psychology which claims to be purely empirical.

As the presence of one thinking principle in all the processes of mind;

These conditions of the possibility of consciousness will be found to include the existence of a mental principle which is a permanent substantial centre of activity, maintaining its own existence by interaction with the rest of the world, and possessing at the same time the attribute of being conscious of the activities and changing states imposed upon it by the rest of the world, and thereby of itself and its own place in the world-system. The nature of the self as substance, however, is a question of metaphysic, which asks the questions: What must the self be in order that it may know the world? and what must the world be that it may be known by the self?

Physiological, as brain and nervous system;

(B) Partly also *physiological* or *organic*—if we admit the dependence of mind to any extent on body. Regarded from this point of view, the conditions of consciousness, so far as

we know them, seem to include a bodily organism in interaction with an extra-organic physical world; and a system of nerves and central ganglia to co-ordinate the processes of the organism, bringing them to a focal point, as it were, and making possible that connection of mental states which consciousness supposes, and that correspondence between mental and bodily states on which the possibility of knowledge depends. For it is certain that the more complicate series and combinations of conscious states (corresponding more adequately to things past, distant, and future) which are peculiar to the more highly endowed beings (men) as compared with the less endowed (animals), are made possible by their having more highly differentiated brains and nervous systems. Hence

It depends also on the possession of an organism,

Relativity of consciousness to organs: As the possibility of our being conscious of the existence of the world around us depends on our having an organism which can be acted on and affected by the world, so our being conscious of the different qualities of external things depends on our having *special organs* through which we are affected by their various qualities. In order to be conscious of the colours of things, we must have elaborately constructed eyes. For sound, taste, touch, smell, we must have ears, etc. Any kind of consciousness which these organs give us depends on the structure of the organs. One organ gives rise to smell, another to taste, another to colour—the quantity and quality of the sensation depending on the organs. And other beings having differently constructed organs, would get different sensations from things; so that their knowledge of the world would be entirely different from ours. Hence consciousness, and therefore knowledge, are *relative* to organization, and may be entirely different in kind in differently organized beings.

And its quality depends on the structure of the organs included in the organism.

"Although human organisms in many respects agree" Spinoza says, "yet in many others they differ," so that what seems good to one seems bad to another; what seems well-ordered to one, seems confused to another; what is pleasing to one, displeases another. "So many men, so many minds." "There are as many tastes as tongues." "One man's meat is another man's poison." Such proverbs show that the feelings which things produce in men's minds depend on their constitution and the structure of their organs. This then is one of the several forms of the principle of relativity.

And this form of relativity has been applied to disprove any universal standard of what is true, beautiful, or good.

Consciousness depends on the metaphysical constitution of the soul;

The principle of relativity may be carried so far as to end in sensationalism and scepticism.

Making different man to have different standards of what is good and true.

And psychological, consisting in the relation of conscious activities themselves.

The ancient Sophists expressed this kind of relative in the maxim, "The man is the measure of all things,"—drawing the sceptical conclusion that there is no absolute and universal standard of what is real, beautiful, or good. Things are to us just as they affect our senses. No universal knowledge, and no metaphysic, or knowledge of things as they are apart from our varying sensations, is attainable (sensationism, scepticism).

Some writers, indeed, have made so much use of this principle of relativity in its various senses, that they have been called 'relativists' *e.g.*, Bain and Spencer. "We do not know any one thing by itself." Bain says, "but only the difference between two." This would mean that we are conscious only of the joint effect which they produce in the mind, and not of either of them separately. And this has been used to disprove the possibility of any real knowledge of either mind or matter; because consciousness, it is said, is the joint product of the two, and it is impossible to determine the exact contribution of either, or to distinguish either of the terms from their common product.

This, however, must not be carried so far as 'relativists' have sometimes carried it, *e.g.*, so far as to say that no uniformity is possible in judgments of quality, quantity, beauty, or goodness—that they are wholly relative to and depend on circumstances, and that "the man is the measure of all things," to the extent that there can be no common standard of what is good, or beautiful, or true (scepticism).

This exaggeration of the consequences of relativity would evidently reduce mind to mere sensation and feeling, and leave no such thing as knowledge. But how could we know relations, or joint effects of relations, to be what they are without knowing the terms of the relations. When we look at the colours, red, yellow, blue, the difference between them enhances the sensations; but we must be conscious of the colours as such in order to be conscious of the differences between them.

(C) But consciousness depends also on conditions that are more purely *psychological*, *i.e.*, lie in the working of the states and activities themselves, and the ways in which they affect one another reciprocally. For the very possibility of consciousness depends on the presence of differences which can be discriminated and compared, and both the quality and the quantity of a state of consciousness are found to depend to no small extent on the other states from which it is discriminated and with which it is therefore compared. Thus there will be no consciousness at all if there are not several different states

a, b, c, etc., which can be distinguished from one another in consciousness ; and the quality and degree of the consciousness of *b*, will depend to some extent on that of *a*, that of *c* on that of *b*, and so on. This dependence of mental states on one another is expressed in the principle of the *Relativity* of conscious states to one another in the sense of their depending on comparison and contrast with one another—that consciousness depends on the possibility of distinguishing differences, agreements and connections between things and that therefore *there can be no consciousness where there is not a plurality of distinct states and objects that can be discriminated as different from one another*. In other words, consciousness depends on *discrimination*, and therefore on the presence of difference, opposition, contrast. Now the contrast and opposition on which consciousness depends is of several different kinds, and some of these have played an important part in the history of philosophy. Thus *relativity* in the sense of contrast is a condition of the very possibility of consciousness, and it is so in two senses :

(1) In the sense that consciousness consists in a discriminating and distinguishing of the states and activities of the self as different from one another in quality and degree ; so that, *if there were not continual changes of activity and state, there could be no consciousness*. "To feel always the same thing," Hobbes says, "is equivalent to not feeling at all." A perfectly uniform, unchanging field of consciousness would be a blank. The state *a* by itself would give no feeling, nor *b* by itself ; but when *a* and *b* are presented together, or in close succession, then the consciousness of both starts forth. Creatures living in perpetual darkness have no consciousness of darkness, as the animals in the mammoth cave of Kentucky, whose eyes have become atrophied with disuse.

Thus we are not aware of the atmosphere we breathe unless its quality or density is suddenly changed. Fishes living deep in the sea, beneath the influence of winds and tides, have probably no consciousness of the water in which they live and move. Though the earth is rushing through space with fifty times the speed of a cannon ball, we have no feeling of the motion. Though we are being whirled

And its psychological conditions include the possibility of contrast in several senses,

A condition which gives rise to the Law of Relativity as a psychological law.

1. Thus the possibility of consciousness supposes plurality and contrast between different states,

For sameness of state, means cessation of consciousness ;

round the earth's axis with the speed of thirty miles a minute, it does not make us dizzy. A man, it has been said, does not know that he has a stomach or a liver so long as the organ functions uniformly.

Hence the 'relativity' of our judgments of things.

From this it follows that our consciousness depends to some extent on what may be called the relativity of our *judgments* of things. In all judgments there is comparison between one thing and other things, and our judgment of a thing depends largely on the things with which it is compared—on the standard of comparison. Thus a tall man gives a stronger impression of his height when beside a short one; a moderate heat seems excessive to one who has come from a cold climate; what is cold to a person in a fever, is warm to a frost-bitten traveller. Thus the intensity of sensations, the pitch of sounds, degrees of illumination, and the like, depend greatly for the effect which they produce consciousness, upon contrast with other impressions of the same kind. So our sense of the beauty of a thing, and goodness of a person, is heightened by contrast with their opposites.

Hence the necessity of change and plurality of states and activities.

From this it follows also that one psychological condition of consciousness is continual change in its materials and objects, *i. e.*, in the states and activities of the self, and therefore in the external things which occasion them. The more monotonously the same objects are kept before the mind, the fainter does the consciousness of them become, till it reaches the vanishing point. The effect of uniformity in diminishing, and of change and contrast in deepening feeling, is illustrated in the universal striving after novelty—for new employments and amusements, new surroundings, new knowledge, and even new political and social institutions.

2. And contrast between subject and object, self and not-self;

(2) Again relativity is a condition of the possibility of consciousness in the sense that the self can know itself only by *contrast with a not-self*; the subject which thinks can be known only in relation to *an object* which it thinks about. In other words, it can know itself only in the act of feeling and knowing something other than itself. Consciousness springs out of the relation and interaction of the two. A self can become conscious of itself only in so far as it feels itself limited, resisted, acted on, by a not-self external to itself.

A condition which has been applied to disprove

Hence the conclusion drawn by some, that consciousness, being necessarily awareness of limit and resistance, is possible only in the case of limited and finite beings. Hence this form

of the law has been used in philosophy by relativists' to prove the impossibility of a universal or absolute consciousness (a personal God); on the ground that an absolute being would have in other being outside of itself to resist it, and thereby to be the external object—the not-self—which is indispensable to contrast, and therefore to consciousness. Hence only finite beings, they say, can be conscious personal beings. But it can be shown that this second form of the law really rises out of first form, *viz.*, the necessity of plurality and contrast among the materials of consciousness; and that this is possible to an absolute being in an even more perfect sense than to a finite one. For a self's consciousness is its awareness of its own changing activities and states. These in the finite self must be caused by its interaction with the other finite things which limit it, and against which it has to preserve itself by external action; and this is the reason why, to a finite mind, an external object is necessary. But if the self were an absolute being, and evolved its activities and states from within itself, unconstrained by anything external, there would be no reason why it should not be conscious of them all the same, *viz.*, by the difference between these as products and itself as what produces them, and by their differences and contrasts among themselves, without any external object. Hence an absolute being has all the conditions and materials of contrast within himself, without supposing a world outside and opposed to himself.

the personality of God.

As by
Spencer on
many other
thinkers.

But a
universal
consciousness
would still
be able to
distinguish
finite things
from itself
and from one
another.

§ 30.

Its contents.

III. Next as to the *contents* or *elements* of which consciousness is made up.—It will be found that consciousness is always a consciousness of three correlative elements which support each other reciprocally in such a way that no one of them is possible without the others. Thus:—

III. In
respect of its
contents, all
consciousness
is conscious-
ness.

(i) It is always a consciousness of *striving*, *effort*, *activity*, because the very life of the self consists in a continual striving to preserve and perfect itself in interaction with the surrounding world—a consciousness of *conation*, in its higher forms called *willing*, *e.g.*, trying to lift a weight, to solve a problem, or escape from a danger.

Of acting, or
striving to
act;

(ii) It is always a consciousness of agreeable or disagreeable *feeling* or *affection*, arising from the different ways in which the self is *affected* by the surrounding world and by its own continual effort of self-preservation—a consciousness of *sensation*, *feeling* and *emotion* pleasurable or painful,

Of being
affected or
acted on

e.g., of cold or hot, of being fresh or weary, of colour, sound, smell, of being pleased or discontented.

And of
cognising
what feels
and acts, and
what is felt
and acted
on,

(iii) It is always a consciousness of *knowing* the *reality* or *realities* underlying and manifested in and through these elements of activity and feeling, *viz.*, the *self* which feels itself as acting and being acted on, and the surrounding *world* which is the occasion of its action and feeling—in the other words, a consciousness of *cognising*, *knowing*, *thinking* and about a world of reality, including both the *self* which is conscious, and something other than self, on which I act, and which resists my action e.g., when we have a feeling of pressure we know that there is some external object pressing against us, when we hear a certain sound we know that a gun has been fired at some distance from us.

That is, self
and not-self.

Thus these three correlative factors—the awareness of *striving* of *feeling*, and of *knowing*—are like the three sides of a triangle, so to speak, and make up, by their co-operation, one concrete process of consciousness, and constitute the conscious life of mind.

Hence all
consciousness
contains
three factors
—feeling,
thinking and
willing :

Which are
related to one
another as
correlatives ;

For we see that the *self*, in order to be conscious must be in a state of incessant *effort* and *activity*, because an absolutely inert thing, even if such a thing could exist at all, could have no consciousness of its own existence. Activity and consequent change of state, again, affect the mental system as a whole for better or worse, and give rise to agreeable or disagreeable *feeling*. And it is only in acting and feeling that the *self* come to *know* itself as subject which acts and feels, and to know other things as external objects in contrast with itself, and thus rise into *knowledge*. And the element of *feeling* has the quality of being agreeable, or disagreeable, pleasurable or painful, desirable or undesirable, according as the *self* is affected for better or worse; and thereby supplies to the *self* a continual motive for *effort* and *activity*, *viz.*, to prolong or attain to agreeable, and escape from disagreeable states; and for seeking to *know* how the one may be avoided and the other attained. Thus *feeling* supplies the spring, end, motive of future action, and *knowledge* supplies the guidance.

As we can
understand
by consider-
ing the origin

In other words, the relation of these three factors of consciousness may be understood in this way. (1) The *self* or *e.g.*, as a finite conditioned being, can exist and

preserve its existence only by interaction with other finite things ; its life is a continual process of adjustment and re-adjustment of itself to present and future circumstances, and therefore, of incessant activity and change. (2) Out of its changing states spring its sensations of touch, temperature, light, etc. and the more general feelings of comfort or discomfort, satisfaction or dissatisfaction, pleasure or pain which form the vague background so to speak, of all its consciousness. (3) And in and through these feelings of its own changing states it becomes cognizant of itself as the subject of them, and of a not-self as the occasion of them. Thus we can see how these factors of *activity* (conation or volition), *feeling*, and *knowing* or *thinking*, must enter as correlative conditions into every process of consciousness.

and meaning
of conscious-
ness itself.

§ 31.

Is a state of Consciousness simple or complex? A question has been raised with regard to the element of feeling (sensation and emotion) which enters into every process of consciousness —whether it is absolutely *simple* and *ultimate* or is a *compound*, produced by more elementary units of feeling, fused together, so to speak, into one mass.

The ques-
tion whether
sensation is a
simple or
compound
mental
state.

A state of sensation seems, indeed, to be simple and uncompounded, but Spencer and others think that every one is produced by the coalescence or fusion of many elementary "shocks" of feeling ; which might, under certain circumstances, be felt separately, but which in ordinary cases run together, and are felt as one compound ; so that, though the units are not felt separately, yet they are present, and determine the quality and intensity of the compound. Thus a musical sound is produced by many hundreds of air waves and beats on the tympanum, but these fuse together in consciousness into one sensation. The sound of the sea is made up of the sounds of thousands of waves ; and these elementary sounds must reach the mind, otherwise it could not be conscious of the collective aggregate. The distant forest presents only a patch of green to the unaided eye, but when a telescope is used, many trees and waving branches are revealed. A cluster of stars is only a milky patch to the eye ; yet the stars composing it must all reach the mind separately, otherwise, it is supposed, the telescope could not show them separately.

It is true
that many
physical
forces are
concerned in
the produc-
tion of every
sensation,

Thus, as physical objects are composed of atoms of matter, so consciousness is made up by the coalescence of "shocks" or "units" of feeling ; and thus the atomic theory is extended to mind. These units have been spoken of figuratively as "mind stuff," or as "mind dust ;" and also as being

But do these
units of
external force
produce
directly cor-
responding
units of

mental
impression ?

sub-conscious, in the sense of being conscious but too faintly so to be distinguishable separately, and therefore lost in the compound. This view accords with the opinion of Leibnitz, that the mental principle receives and retains infinitesimal modifications, though only compounds of them rise into clear consciousness. It agrees closely also with the Spinozist theory of the origin of mind by amalgamation of many modes or units of idea.

Or do they
fuse together
in one
brain state,
before they
reach the
mind ?

Others think, however, (*e. g.* James) that the elementary "shocks" or "pulses" are not units of feeling, but merely successive waves of nerve-force ; which do not reach mind separately, but combine in one resultant process or state of brain ; and that it is this one resultant brain-process that directly gives rise to the feeling, and not the separate "shocks". There is no such thing as fusion and composition of mental states ; only of brain states. Hence though the physical stimulus is complex, the feeling itself is really simple and uncompounded. This would require us to suppose that the forces of the brain meet somewhere in a single point, and there fuse together into one simple resultant activity which somehow passes over into mind, producing a simple mind state. But there is no evidence of this, and many psychologists ascribe more work to the brain than it is capable of performing—work which is not possible in terms of molecules and molecular motions. Besides there can be no such thing as a simple brain state ; every one is inconceivably complex ; and if feeling really correspond directly to brain, then feeling also must be complex. According to the theory of *sub-conscious mental modifications*, the "shocks" or minute impressions are really mental (and not cerebral merely), though not distinctly conscious.

§ 32.

Its objects.

IV. All consciousness contains an element of knowing, and therefore something known.

IV. Next as to the *objects* which are known in consciousness.—To be conscious is to be conscious of something. And that consciousness includes not only the feeling or state of ourself, but also a something which gives rise to the feeling, and whose existence is revealed by the feeling. This is equivalent to saying that consciousness includes an element of knowing, and therefore requires something to be *known*—an *object*. What then is it that we know in being conscious ?

For acting and feeling are only processes (and therefore by themselves only abstractions) ; and we cannot be conscious of them without being conscious of concrete reality

as something which acts and feels, and something which is acted on and felt. This is what we mean by saying that there is a factor of cognition contained in all consciousness along with acting and feeling. What is it, then, that is *known* (at least implicitly) in all consciousness?

The object known seems to be two-fold—to be in fact two objects in correlation with each other. For—

(i) The *primary* object cognised in consciousness is evidently the self, or that which is conscious. The self acts and thereby changes its states; feels these changing states; and in so doing knows that they are *its own* states, and thereby *cognises itself* as the subject of them. The self, therefore, is both subject and primary object of consciousness.

Thus the mental principle in being conscious is conscious of itself as subject—it feels its states as its own,

For while all other activity passes outwards, so to speak, upon other things, consciousness is essentially *reflection*, or a turning backward of the subject upon itself—a feeling, pleasurable or painful, of its own changing states; and, in and through the feeling, a cognition of itself as the subject of them. Hence all consciousness is fundamentally and essentially *self-consciousness*. Its *primary* object, at least, is the self which is conscious. The self cannot be conscious of other things as other without being conscious of itself as being conscious of them.

And itself as having them.

For if the self did not directly know itself as a reality (as what thinks and acts), it could not go outside of itself to discover reality elsewhere, and therefore could never know reality at all. Whatever notion it has of substantiality and reality it must derive from itself. In self-consciousness, subject and object—that which feels and that which is felt, that which knows and that which is known—must be identical.

(ii) But there is also a *secondary* object present in consciousness. We are conscious of ourselves not only as thinking, but also as thinking something other than ourselves. In other words, in being conscious of self, we are cognisant at the same time of a not-self, or surrounding world in opposition to, and in contrast with self. The one may be said to be a *positive*, the other a *negative* object.

But in being conscious of itself, it is conscious less directly of something different from itself,

We can see two reasons why this secondary object must enter in some way into all clear consciousness: (1) The finite self cannot be conscious without being excited to conscious

For internal and external perception are correla-

tive to each other;

activity by something other than itself, and there can be no activity without something to act upon; and (2) by the law of relativity, it can be conscious of self only in contrast with something other than self. We say, therefore, that *self*-consciousness is always accompanied by *other*-consciousness—perception of *internal* reality by perception of *external*. But the one is given *positively* (what we ourselves are), the other only *negatively* (what we ourselves are not).

So that in having a positive cognition of self, we have a negative one of something that is not-self,

Of a world of reality external to itself.

And we can not adopt any other view without falling into contradiction.

V. Does mind cease to exist as such when consciousness ceases?

Thus we find that consciousness is fundamentally consciousness of self and its changing states; for if the ego were not cognisant in the first instance of itself, it could not go out of itself, to become cognisant of anything else. But consciousness depends so much on relation and contrast, that we cannot understand how it could know itself except in contrast with a not-self, *i. e.*, without knowing not-self at one and the same time with itself. Hence it would appear that, if consciousness have the self or subject as its primary object, it must at the same time have a secondary object, *viz.*, the not-self or external world, as the necessary contrast and correlative of the self, without which it could not be thought. And further, we know that the self as a finite being lives by action and re-action with other finite things, so that its consciousness must be fundamentally a consciousness of this interaction, involving both the related terms, not-self as well as self.

Thus Hamilton, in his analysis of external perception, showed that *self*-cognition and *other*-cognition (or cognition of an external world) are inseparable correlatives, contained in one and the same original process of consciousness, and we cannot adopt any other view without falling into confusion and contradiction of thought. But though consciousness thus reveals to us the existence of a world external to ourselves, all that it *directly* reveals concerning it is that it exists and is the ground and occasion of the limitations which we ourselves feel (making us to be limited beings), *viz.*, by resisting and imposing sensations upon us.

§ 33.

V. *Is mind always conscious?* Finally, we may consider further the question of the *relation of consciousness to mind itself*. The question here is, whether mind and consciousness must be co-extensive and iden-

tical, or whether mind and mental work are possible without consciousness. It was stated above that the essence of mind, or what makes mind to be mind, is consciousness. But this may be understood in two ways : (a) Must we suppose that the consciousness which makes mind to be mind is always present consciousness and that there is no mind except where the consciousness is present and actual ?—in which case mind will be practically the series of states of consciousness and nothing more. Mind and consciousness will be, as many maintain, identical and co-extensive; so that mind is mind only in so far as it is *actually* conscious, and ceases to exist when consciousness ceases. If so, whatever goes on beneath the threshold of consciousness will be outside of mind altogether and belong to the sphere of matter. Or (b) may we suppose that there is something which strives to *become* conscious, and which is therefore mental in its nature, even while its striving is still beneath the level of actual consciousness ? In this case, mind will not be merely the series of conscious states, but the effort and striving to become and continue conscious, and its processes may be *sub-conscious* or beneath the level of consciousness without ceasing to be mental, and may be spoken of as *sub-conscious ideation*.

This question has important bearing both in psychology and philosophy ; and there are three hypotheses bearing on the subject :—

(1) According to the *materialistic* metaphysic, mind, being only as occasional product of matter, is identical with the series of conscious states, and ceases to exist when these cease (as in sleep), and comes into existence again when these re-appear. What remains in the interval is merely states and processes of brain ; and knowledge, when not present in consciousness, is preserved as vibrations or arrangements of brain cells and molecules. Out of consciousness is out of mind. There is no such thing as unconscious *ideation* or mind-work, but only unconscious *cerebration*, or brain work. One obvious objection to this is that it supposes mind to be always subsiding into nothingness as in sleep and forgetfulness ; and springing from nothing into actuality again every time we awake. The mode of thinking called *sensationism* also identifies

Or is mental work possible without consciousness ?

Is sub-conscious ideation possible ?

Materialism holds that when consciousness ceases, nothing is left but brain and brain-work.

mind with the series of conscious states (Mill), but avoids any metaphysical explanation of them such as materialism gives.

Parallelism holds that when connected consciousness breaks up, it is not lost, but dissipated into units which are conscious but not connected.

(2) The theory of *parallelism*, also, makes mind and consciousness to be co-extensive and identical. This it does by supposing that mind in the concrete sense is formed by the integrating together in one system, of many units of consciousness originally separate ; and supposing that when mind, properly so called, ceases, it is by the breaking up of its unitary consciousness into the many discrete elements of which it was composed, so that what is out of the individual mind is not out of all mind. As a material object may be resolved into many atoms and molecules, so a mind may be resolved back into many units of consciousness ('mind-dust', they have been called). Thus the individual mind does not spring out of nothing, but is formed by the coalescence of many units of consciousness into one organized whole or "consciousness of many units of consciousness," corresponding to the organised system of space-forms (atoms) which constitutes the body ; and it does not fall back into nothing again, but breaks up into the more elementary forms of consciousness from which it was derived.

Making mind in the higher sense to depend on continuity of consciousness by means of memory.

This is in accordance with the theory of some physiologists that every *neuron* is a living creature with the mind of its own, and that the life and mind of the whole results from the coalescence of the many units. Thus the parallelist hypothesis supplies an explanation of how work may go on beneath the level of our collective consciousness without ceasing to be mental.

Recent investigation however seems to establish the existence of sub-conscious mental work.

(3) But we can understand how mental work may go on sub-consciously, without applying this hypothesis of parallelism. We can understand that mental work, as well as physical, is subject to degrees of intensity and organization ; and that consciousness, though *implicit* and *potential* in all mental activity, can become *actual* only when a certain intensity, and a certain order or organisation of activities, has been attained. We can suppose thus a threshold, or point of *liminal* intensity, at which mental activity, ideation, or working of ideas, becomes conscious, and below which it sinks into sub-consciousness again, without ceasing to be mental.

Work that is mental with-

This, then, is equivalent to assuming the possibility of *sub-conscious* or *unconscious* mental work, and to affirming

that becoming conscious is only the concentrating, organizing, and intensifying of mental activity previously going on, and not a springing of mind out of nothing.

out being conscious.

For observation and experiment make it more and more evident that what enters into the sphere of consciousness is only a small part of the work which is really mental. The larger part of that work is carried on below the threshold of consciousness ; and conscious mental life is the product or resultant of what has been going on sub-consciously. States of actual consciousness are like the tops of the waves rising into the sunlight while the currents which produce them flow on in darkness below.

For only a small part of the work of thought is carried on consciously,

Thus the experiences and acquisitions of our past life, all that we have learnt and done, are still present in sub-conscious traces or effects, ready to be raised into consciousness again in memory ; the work of combining ideas and forming new trains of thought, characteristic of the poet, inventor, and scientific discoverer—the reasonings even of the calculator and philosopher—are carried on largely in the sub-conscious sphere ; and instinctive impulses to action, good or bad, spring from there. Hence mind has been compared to an ice-berg floating one ninth above water and eight ninths below ; and mental activity, to the vibrations of ether which, at a certain rate of rapidity, make themselves felt as light, but below that are not felt at all.

As is seen in the preservation of our past experiences in the form of memory.

Can we suppose, on the other hand, that when thought sinks out of consciousness, nothing is left but mechanism of brain—that this all but infinite sub-conscious activity is nothing but integrations and disintegrations of the molecules of cells and fibrils, and changes in the position and arrangement of their atoms ; and that what we suppose to be sub-conscious thought is nothing but *unconscious cerebration* ? No : it is obvious that the brain-theory is inadequate ; that, though brain-work is the medium through which thought manifests itself in the world, it is not itself thought ; and that, though consciousness is implicit as tendency in all mind-work, yet it becomes explicit and actual only when mind-work reaches a certain intensity and degree.

For molecules and fibres could not do the work of thought.

This principle of sub-conscious mental modification was insisted on by Leibnitz, Hamilton and Hartmann especially, on philosophical grounds ; but has latterly found support from experimental investigation. Yet it is opposed by some psychologists on the ground that unconscious thought is a contradiction in terms. Unconscious *feeling* would certainly be a contradiction ; but it is not *feeling*, but *ideation*, or the

Therefore it is necessary to suppose that mental work may go on without being conscious.

working of ideas, that is said to go on to some extent sub-consciously ; and we have reasons to believe that *idea* is something more than the *consciousness* of idea—that it is a force and tendency which may sink below the level of consciousness, but still be mental, and not a mere modification of brain.

Indeed sub-conscious work is necessary to give connection and unity to conscious work.

And that sub-conscious work must itself be mental.

Sub-conscious and unconscious.

And without some such explanation as this hypothesis supplies, it is difficult to understand the unity and connection of mental life. For *conscious* life is only a series of fragments—mere *disjecta membra* of mind—and it is hard to understand what gives them the connection and unity which they have, unless it be a continuous *subliminal* activity of the mental principle itself. The tendency to explain everything by imaginary brain processes may be carried too far. Molecules and their combinations and disintegrations cannot be made to account for the unity of conscious life. The molecules must be subject to a power which gives and controls their motions, and gives them their co-ordination and unity.

The use of these words, 'unconscious' and 'sub-conscious' is still unsettled. 'Sub-conscious' is often used for any vague indistinct kind of consciousness of which we are ourselves not clearly aware. But the result of this is that no clear difference is left between sub-conscious and unconscious. But 'sub-conscious' has a clear meaning if we regard mental work as subject to degree of intensity and organization (as seems now clearly established), in which case there will be a *limen* or border of consciousness ; and mental activity may rise above or sink below the *limen* (becoming subliminal). The word will then apply correctly to all work which is at present below the liminal degree, but is capable of rising above it into clear consciousness, and is therefore mental. 'Unconscious' will then apply to work which cannot become conscious of itself, and is therefore non-mental (physical and cerebral merely).

Self-consciousness.

§ 34.

All explicit consciousness involves consciousness of self as its subject :

We now understand that in being conscious of effort, feeling and thinking, we are at the same time conscious of the effort and feeling as *ours*, and therefore of *ourselves* as that which strives, and feels, and thinks. This is equivalent to saying that our consciousness includes *self-consciousness*.

In other words, in being conscious of the effort and activity by which we assert and preserve our own existence in the world, and of the changing states which rise out of that activity, we are conscious of *ourselves* as performing these acts and experiencing these states ; in other words, as the subject of them.

This is equivalent to saying that we are conscious of ourself as the *reality* which acts and feels, and of the acting and feeling as functions and manifestations of ourself; and that we are conscious of all our successive activities as so many applications of the one power of self-preservation and self-development which constitutes the permanent essence of our self.

And therefore
as reality;

It is indeed possible that there may be low forms of consciousness (as in animals) in which there is no explicit discrimination of self from feelings—of subject from states—and which is vague feeling and nothing more. But it is certain that in fully developed and explicit consciousness, the states are always accompanied by the awareness that they are *my* states, and therefore of myself as subject of them.

Now this cognition of self is the most fundamental fact of experience, and that on which all knowledge and understanding of the world is built. It is this cognition of self and its states and activities that supplies us with our idea of substance and attributes, agent and activity; and it is according to the analogy of self, and in terms of its conscious states, that we are able to conceive and think other things and minds. In being aware of self, indeed, we are aware of not-self in contrast with self; but this cognition is but a secondary and negative one. The not-self is to us but *an unknown reality not ourselves*, until we invest it, by analogy, with attributes which we are directly conscious of only in ourselves.

And as im-
mediately
known re-
ality, and to
us the type
of all reality,

“Our one certainty,” it has been said, “is the existence of the mental world;” and even “the field of natural science is essentially the contents of the mind”—projected from ourselves and ascribed to the not-self. But our certainty of the mental world must rest on the certainty of our own conscious self, as the underlying reality which gives to the contents of that world the connection and permanence which makes them to be a world.

For no rea-
lity is direc-
tly known
to us which
is not mental.

We have, then, to consider first what our consciousness reveals directly regarding our self; or how far the mental principle manifests itself to itself in consciousness. After that we may consider certain attempts that have been made to explain away what is here assumed to be the revelation of consciousness regarding the self. Hence—

What information then does consciousness directly give regarding self?

It gives a cognition of self as the reality of which present states and activities are functions.

For all distinct consciousness contains the self as its subject,

And to know things is to know self as knowing them.

Psychology which denies the cognition

1. The unity and identity of self, or what conscious experience directly reveals concerning the self.—All consciousness is essentially a process of *reflection* or *turning back* of the agent upon itself (in contrast to other activity which passes outwards, so to speak, upon other things); so that the sphere of *immediate* consciousness is *an inner circle* (the knowledge which is *positive* and *intuitive*), to which the rest of the world is *an outer circle* (the knowledge of which is relatively *negative* and *indirect*). Now we find that two fundamental facts are revealed regarding the self, in the process of conscious reflection.—

1. In every *present* activity of thinking, feeling and willing, the self distinguishes itself both from the processes of thinking and willing, and from the object thought and willed; and manifests itself to itself as *the subject or agent which thinks, feels and wills*. In every explicit process of consciousness—in perceiving, remembering, reasoning, desiring—we are conscious of the process as *ours*. We know that it is *we* that are perceiving, remembering, or desiring. This is equivalent to knowing our *self* as what perceives, remembers, and desires—*i.e.*, as the *subject or agent* of the process. Without this cognition of self the understanding of reality and function, substance and attribute would be impossible, and without this, knowledge would be impossible.

Thus there is no awareness of the changing states without awareness of the self or subject of which they are the states, nor of the self or subject apart from the changing states; but only of the two together, and in mutual correlation, as one concrete reality. There is no perception of external things without awareness of self as perceiving them; and no conception of other selves or persons except by multiplying, in imagination, the one self given directly in consciousness.

Hence all knowledge and understanding of things supposes and rests upon this fundamental cognition of self as subject that knows. And the cognition of self as reality includes the cognition of its being a living and active principle—something which preserves its own existence against, and reacts and imposes its will upon other things. Hence

There are two reasons why the cognition of self must always be present.—(i) Feeling or sensibility is not itself a substance, or what can subsist by itself, but only a state, process, or function

of something and therefore, apart from the subject which feels, it would be only an abstraction equal to nothing. The concrete reality is the thing and its activity together. Those writers who speak of sensations and feelings as feeling and knowing one another, and of self as nothing more than the *sum the feelings* are *substantialising abstractions*. The subject which experiences feeling is not itself a feeling; but, in experiencing feelings, must be aware of itself as feeling them. We can think, indeed of feeling in general, apart from the subject which feels something but this is by a process of analogy involving imagination, abstraction and inference. And all feeling is *primarily* one's own feeling and is felt as such. (ii) On the other hand, a self or subject, apart from the activities and states in which it manifests itself, would be substance without quality, which is equal to nothing. The concrete reality is the two in correlation - each being the ground of the other.

Some indeed deny this, and say that even rational beings may have many conscious states in which there is no awareness of self—no *self-consciousness*. Now we do sometimes speak of a person as being "out of his mind," or as being "lost in amazement and dismay," and so on, but these are only figures of speech. A feeling would not be *our* feeling if we were not aware of it as such, and therefore of ourselves as having it. Nor could we afterwards remember it as ours, if we had not originally been conscious of it as ours, and of our self as the one subject of past and present experience. The element of self-consciousness, therefore, though it may be faint in degree, can never be absent from the experience of rational beings.

2. But further, in reviving and thinking over again *past* sensations, thoughts, and acts, (*i. e.* in remembering), it recognises *them* also as its own, and itself as having been the subject or agent of them in past time; and thereby distinguishes and manifests itself as something *permanent* which has existed continuously through a long series of states and activities, and which by its own unity and identity as the one subject of them all, connects them all together into the unity of a single mental life. In other words, in recalling past experiences in the form of memory, the experiences recalled are recognised as former experiences of the same self which recalls them. Remembering our past experiences is equivalent to remembering *our self* as experiencing them; and thereby, to cognising self as the one subject present in them all. Thus past and present experiences are felt as one continuous system of states and activities in time, constituting the self-manifestation or mental life of one single self. Thus without the consciousness of self as a permanent reality, memory

of self as reality, is obliged to turn abstractions into realities,

Dealing with sensations as if they were themselves things.

It gives a cognition of self as the one reality of which past as well as present states and activities are functions.

of the past and anticipation of the future would be impossible and therefore rational mind.

This is equivalent to recognising self as a permanent individual ;

And as a self distinguishing, self-regulating individual, i. e. a person.

And this : because all its activities are but applications of the one fundamental activity of self-preservation.

And the mind can understand one state of itself only by comparing it with other states of self.

But this consciousness of the sub-

The self thus recognises itself in its consciousness as a single permanent principle manifesting itself to itself in a connected system of states and activities in time, and at the same time distinguishing itself from them, and asserting itself as one and the same identical principle through all successive states, and connecting them all together into the unity of a single mental life. And this is equivalent to saying that it is conscious of itself as a permanent, self-distinguishing individual or person, realising itself in a series of activities in time, i. e., of its own personal identity and substantial reality (substance being, by definition, what preserves its own essential identity and continuity through changes of state).

And this permanent identity of the self may be understood in this way. The essence of a *real* thing, or that which it makes to be real, is the energy of self-preservation and self-development inherent in it. The successive activities of the real, therefore, are but so many successive applications (adapted to changing circumstances) of the one fundamental activity of self-preservation which is its essence. Thus the self recognises all its successive activities as its own, and its own identity through them all, because they are but so many applications of the self-preserving power which is the essence of itself.

And we can understand this unity of mental life better if we reflect that an activity and state is possible only in connection with other antecedent ones in a series or system connected by causality ; so that the self could not feel itself the subject of one without feeling itself the subject also of the whole series as connected factors of one life, and recognising itself as the unifying principle of the whole. (Hence Kant thought that the successive actions of a lifetime might be considered as but phenomenal manifestations in time of a single transcendental act, constituting the metaphysical essence of the self above time.)

Thus we cannot really get rid of the fact that consciousness reveals directly the unity and permanent identity of the self or subject. Nevertheless we have to consider a theory of mind which denies or ignores this fact. Hence

§ 35

II. Theory which rejects the unity and identity of self.—

Attempts are made nevertheless, to deny the validity of this apparent consciousness of the essential unity and perma-

nent identity of the mental principle. It must be admitted indeed, that, in the experiences which make up what we call *self-consciousness*, we at least *appear* to ourselves to be conscious of our own reality and permanent identity, and this appearance is a fact which must be taken into account in experiential psychology. The question may be raised, however, whether this apparent consciousness of personal continuity is real or not,—whether the idea and belief which experience thus leads us to form, of the self as permanent and substantial reality, correspond to the fact, or is only an illusion.

That the permanence of self is an illusion.—The doubt is strengthened by many examples of apparent change of identity and personality. For if the series of past experiences is interrupted by loss of memory as sometimes happens, then the subject ceases to be aware of its own identity in the past, and enters on what is, to his own self-consciousness, a new life, and seems to become a new person. There are also cases of "alterating personality," in which an individual loses memory of his past, and enters for a time on a new life; but after a time forgets that new life and recovers the continuity of the old one. And there have been cases of repeated alternation from the one to the other, without any amalgamation of the two. And cases have been known of a person remembering his own past experiences but regarding them down to a certain point, as not his own experiences, but those of another person. Hence, it is argued, the evidence of self-consciousness is not to be depended on as to the substantiality and permanent identity of the self. It may be only an illusion.

But, if it is only an illusion, how does the illusion arise? The treatment of this question involves both metaphysical and psychological considerations. Sensationism and materialism agree in holding that this apparent consciousness of the substantial reality and identity of the self is an illusion, and endeavour to explain, each in its own way, how the illusion arises. Thus—

1. *Sensationism* or *associationism* assumes that the common idea of self is not a fact of experience but a metaphysical idea, based on inference; and in its effort

stantiality
and perma-
nent identity
of self is de-
nied by some;

Who point
to cases of
apparent loss
of identity,
and change of
personality,

Multiple
personality.

But if perso-
nal identity
be an illusion
how is the
apparent con-
sciousness of
it to be ac-
counted for?

Sensationist
phenomena-
alism
explains the

self as the series of associated sensations and feelings merely (Mill);

But how could feelings be conscious of themselves either singly or as series ?

Which is Mill's paradox ;

to avoid everything metaphysical assumes that mind is nothing more than the *series* of conscious states, and that the self is only this series so far as it is preserved and revived in memory. The self may, therefore, be reduced in content by loss of memory, or even divided into two or more selves by interruptions of memory. The word soul is simply a name for the series of mental phenomena which make up the remembered experience of the individual mind. No reference to a permanent, substantial unifying principle is necessary.

But how are we to account, then, for the apparent consciousness of self as unity and reality ? If it is only an illusion, how does the illusion arise ? The answer is : in thinking the successive states which make up our experience, we *think* of something permanent behind the changing states. This something is only an abstraction made by our own thought. Yet by the fallacy of substantialising abstractions, we think of this abstraction as a real thing, and call it self. The self therefore is a logical illusion. But if we ask : what then is the real thing ?—sensationists say, nothing is real but the sensations themselves. In other words, having abolished other substance, they make feelings themselves to be substances.

Thus according to Mill “we have no consciousness of mind as distinguished from its conscious manifestations,” *i. e.*, from the series of sensations and feelings. But how, then, do I come to think of my mind as a continuous and permanent something ? In this way.—Having experienced actual sensations, I can imagine any number of possible ones. By doing so, I fill up the gaps of actual sensations by filling in possible ones from my own imagination, and thus think of mind as continuous and permanent. Hence “my mind is but a series of feelings or thread of consciousness supplemented by believed possibilities of consciousness.” But states of consciousness change every moment. What, then, about the identity and oneness which self-consciousness ascribes to mind ? In regard to this, he admits “if we speak of mind as a series of feelings, we are obliged to complete the statement by calling it a series which is aware of itself as past and future ;” in other words, the series is conscious of itself as a series. This conclusion, “that a series of feelings can be aware of itself as a series,” is, he admits, a paradox but we must either accept this paradox or be reduced to the (metaphysical) alternative of “believing that mind or ego is something different from any series of feelings.” He seems to prefer the psychological paradox ; but it can be seen that his argument everywhere assumes that the ‘we,’ ‘ego,’ or ‘self,’ is something which *has* the feelings, and not the

feelings themselves—that his refutation everywhere assumes what he is trying to refute.

And, indeed, the last statement on the subject by Mill himself was that “there is a bond of some sort among all the parts of the series which makes us say that they were the feelings of the same person throughout, and this bond to me constitutes my ego.” But this is admitting all that is claimed for self-consciousness—the self is the bond.

Others have attempted to explain the self as identical always with the aggregate consciousness of the present moment, including within it both present sensations, and former ones revived in the form of ideas. Hence our self is shifting and changing every moment as the sensations and ideas composing it shift and change. What produces the appearance of continuity and unity is the fact that sensations of the past are reproduced as contents of the present aggregate consciousness, *viz.*, as ideas of memory. The consciousness of the present moment conceives itself to be identical with consciousness of the past because it contains the past within it (*viz.* in the form of ideas). Thus the self of the present moment consists of the sensations and feelings of the present moment together with those of former times revived in idea, and what makes us think of self as something which has continued to exist through former times, is simply the presence in idea, of these sensations of former times (James). This, however, is only Mill’s account stated in a different way.

Or as the consciousness of the present moment containing the past within it in the form of memory (James).

But such explanations fail especially (a) to explain the powers of recognising present ideas as reproductions of past experiences, because recognition supposes the understanding of past time, and time can be understood only by a thinking principle which continues the same through past and present and (b) to explain the unity and connection of all mental activities as functions of one self (or what Kant calls “the synthetic unity of apperception”), for this unity implies that the self, so far from being identical with the aggregate or series of states, is present in them all as an active principle which elaborates, interprets, and builds them up into the system of knowledge. States of consciousness can have no meaning except when considered in relation to other states, and they can be so considered only by a thinking principle which is present in them all, and is therefore able to think them all in their relations to one another. Indeed such states can have no existence except as states of a thinking self, and as materials upon which it operates. How can one state of consciousness be conscious of itself and of other states, and

But such theories fail to explain the consciousness of self and the unity of self,

Which imply a single thinking principle present in all activities of thought.

recognise them as past and present? Surely this is an abuse of words.

Materialism explains unity of mind as due to the physiological unity of body and brain,

Which however, is a unity of form merely, not of substance,

And not such an inner and essential unity such as pertains to mind.

These views must be rejected therefore,

And it must be admitted that

2. *Materialism*, on the other hand, is less afraid of metaphysic, and while it gives the same account of mind and self as sensationism (*viz.*, that it is nothing but the aggregate of conscious states), seeks to explain and justify this assumption by assuming a metaphysical substance underlying sensations. But what it assumes as real substance, is matter and physical forces in the form of organism and brain. These retain their identity; though it is not really an identity of substance after all, *but only of form*, because the matter of the body is constantly changing. The effects of past experiences are retained in modifications of the brain-cells and fibres, making a reproduction of them possible in the fainter form of ideas. Present brain processes produce present sensations, and along with these, reproductions of past sensations (*i.e.*, ideas of memory) and feelings of pleasure and pain. And the series of sensations, ideas and feelings constitutes mind. There is no other unity and identity than those of the brain and organism. *The identity of mind is like that of the candle-flame.* The particle of carbon and oxygen, which by their combination make the flame, are continually being dissipated in the air, but the flame apparently remains the same. What is really the same is only its form. So it is with mind.

But this materialist theory leaves us with much the same difficulty as the more superficial sensationist theory, *viz.*, how to explain the unity of self-consciousness. The successive mental states themselves do not form a unity. And the brain itself is not a real unity, but a plurality of molecules, fibres and cells, constantly changing. The other difficulties of materialism have already been referred to.

Too much importance may be attached to the so-called changes of personality. These changes are only superficial, and due to suspension of memory. The essential constitution of the self remains the same. The whole continuous past is still retained sub-consciously, and may at any time re-assert itself in consciousness. It is only from the sensationist point of view which recognises no mental reality beneath the level of changing sensations and feelings that they can be said to constitute changes of personality.

On the whole then, reason, if it is to be consistent with itself, cannot avoid recognizing the substantial reality and

unity of the self as revealed in self-consciousness; and not only so; but must recognize that the reality of *self is the ultimate source and prototype of the ideas of unity, reality and substantiality, which we extend by analogy to other things*. If we did not obtain these ideas by observation of ourselves, we could not derive them from any other source. It is only by resting on the reality of self that we can reach out to the reality of other things. Without this fundamental hold on reality, all experience would be a disorderly nightmare, and all knowledge and science would be impossible.

We must be on our guard, however, against applying to the self or ego the concrete representations of substance which we apply in the case of matter; and thinking of soul as a concrete unchangeable particle, like a grain of sand, or atom of carbon. It is the tendency to apply such a phenomenal, pictorial, "figurate" conception of substance to mind, that has made many reluctant to think of mind as substance at all; and has led to the confused sensationalism or materialism, or illogical intermixture of both, which pervades so much recent psychology.

self-consciousness gives our ultimate cognition of reality.

And that we understand other things as real by thinking them after the analogy of self.

PART III. MENTAL SCIENCE.

VI.

SCOPE AND METHOD OF MENTAL SCIENCE.

§ 36.

Science of
mind, as now
commonly
distinguished
from the
metaphysic
of mind,

The aim of psychology in its widest sense is the accurate investigation of the nature of mind. Mind can be investigated only in and through its phenomena or manifestations. Empirical psychology, we have found, limits itself to the investigation of the contents, order and connection of the phenomena, as if mind involved nothing more than the series or aggregate of the phenomena called mental. Metaphysical psychology and philosophy go farther, and seek to draw what conclusions can be drawn from the phenomena regarding the mental reality which manifests itself in and through the phenomena, and its place in, and relation with the rest of the world. The investigation of the *phenomena* is what is now commonly called "mental science" or "scientific psychology," and separated from the metaphysic and philosophy of mind. The logical weakness of this kind of psychology is that in the attempt to keep the mental phenomena apart from mind as substance, it tends to make the phenomena themselves to be substances. We may consider the scope of mental science in this sense, and then the methods of investigation which apply to it.—

I. Has for
its sphere the
study of the
phenomena
of mind ;

And of these
there are two
classes :

I. The sphere of *empirical psychology* and the mental sciences is the investigation of the phenomena or manifestations of mind (or mind in so far as contained in its phenomena and products) by the same methods of *observation analysis experiment and induction* as are applied to the sciences which investigate the phenomena of external nature.

But the phenomena of mind are themselves, we have found, of two kinds, *viz.*, *internal* and *external*, *subjective* and *objective*; that is, revelations which mind makes *directly to itself* in self-consciousness, and revelations which every

mind makes to other minds indirectly through changes and products produced by it in the physical world. We know ourselves by what we are directly conscious of in ourselves, *viz.*, by the thoughts, feelings, desires and activities which we are aware of in our own self, and therefore directly or intuitively. Others know us by what we do, *i. e.*, by our outward works and productions and therefore indirectly and inferentially. Hence—

(a) Empirical or 'scientific' mental science includes within its scope, first of all, the mind's manifestations of itself to itself internally, *viz.*, the phenomena of its own self-consciousness—such as the processes of sensation, perceiving, remembering, imagining, conceiving, reasoning, desiring, willing, and their internal products such as percepts, ideas, beliefs, desires, volitions, as they appear in consciousness—including the ideas and beliefs which consciousness enables mind to form regarding itself as subject, and regarding the external world.

This, then, is the sphere of *subjective, introspective* and *analytical* psychology in so far as it continues to be purely empirical, on which all other forms ultimately rest. Indeed all the sciences are dependent in a sense on this form of psychology, because all the knowledge that they give is founded on sensations, and attained by processes of remembering and thinking; and all involve the use of such fundamental ideas as substance and quality, cause and effect, mind and matter, space and time, concrete and abstract, belief and disbelief; and it is analytical psychology that shows how these ideas are formed in the mind, and defines the thought or meaning contained in them (though the question, how far and in what sense they correspond to extramental reality, belongs to metaphysic). Hence there is much psychology assumed in all sciences, whether it be correct psychology or not.

(b) Empirical mental science includes within its scope also the manifestations of minds to other minds externally through the medium of the organism and physical world. Thus every mind embodies itself in an organism, and through its organism produces effects on extra-organic things; while these, again, produce effects on other organisms, and thereby on the minds which animate them, (*viz.*, by occasioning sensations in them). The minds thus affected learn by experience to interpret the sensations thus occasioned in them as phenomena or effects of what is going on in other minds, though communicated through a material medium. Thus one mind cannot look into another mind, and directly see its ideas, feelings and desires; but minds

(a) The
minds' mani-
festations of
itself to itself
in its self-con-
sciousness."

And all
knowledge of
mind, and of
other things
as well, rests
ultimately on
mind's cons-
ciousness of
itself.

(b) Mind's
manifesta-
tions of itself
to other
minds in
looks, words,
and works.

embody and express their ideas and desires in books, words and movements, and in external things and institutions (*i.e.*, in objective products), and other minds interpret their ideas and desires as they are expressed in these external products.

Whence those mental sciences which study the external products of mind ;

Including that branch which attempts to apply measurement to mental processes.

And those which deal with language, literature, art and religion.

II. And has two principal methods corresponding to these two ways of regarding mind ;

Mental phenomena of this kind, *i.e.*, the external products of minds, constitute the sphere of various *objective* mental sciences, which seek to determine what can be learnt of the minds of individuals and of races through such external manifestations of them.

Thus mind manifests itself to other minds in the structure and processes of its organism, especially in those of brain, nerves, muscles, and organs of sense ; and the structure and working of these form the sphere of *physiological* psychology. And when the organic manifestations of mind are made the subjects of measurement and experiment with a view to determine the duration and degree of the corresponding mental processes, this study is called *psychophysics*, or experimental psychology.

It manifests itself also in language and literature in their many forms ; in works of industrial art, and fine art, in social manners and customs, in political institutions, in mythologies and religions, and in the events of history. All these involve external products of mind, or effects produced by mind on the physical world, which, again, manifests themselves to other minds, and thereby reveal the character, of the minds which produced them. Hence these outward expressions and embodiments are sometimes spoken of as *objective mind*—mind objectified or externalised, as it were, *i.e.*, embodied in external things. They all, therefore, supply materials which fall within the scope of psychology and the other mental sciences based on it, such as ethics, aesthetics, sociology, politics, religion, etc.

§ 37.

II. The *methods* of empirical psychology will correspond to the above two classes of phenomena coming within its scope. There will, therefore, be two principal methods of psychological investigation, *viz.*, by looking inwards upon one's own mind, and by looking outwards upon the external manifestations and products of the minds of others ; in other words, by the study of our own minds and mental processes as we are conscious of them within ourselves, and the study of other

minds as revealed to us in their external manifestations. The former may be called the *subjective*, and the latter the *objective* method of mental study. Hence—

1. The method of subjective *self-observation, reflection, or self-consciousness*, consists in turning one's attention inward so as to observe and analyse the states and processes of one's own mind, as they are going on at the moment, or as they are afterwards reproduced by power of memory.

Thus one may feel a pain, and may at the same time observe the pain so as to compare it with other pains he has experienced, and determine where it is seated, and what is its cause. He may taste two or three kinds of fruit in succession, and observe and compare the different kinds of taste-sensation, which they give, and classify them accordingly. He may have sensations of smell, sound, colour, and feelings of anger, hope, fear, and may observe them so as to distinguish them from, and compare them with other sensations and feelings, and classify them according to their resemblances and differences. He may observe and compare the different kinds of intellectual activity exercised in reading a poem, solving a mathematical problem, composing an essay, and so on. In all this, then, he is observing what is, or has been going on in his own mind—his own *subjective* experience.

This has been called the method of reflection or introspection, because it consists in turning back and *looking inward* upon the contents of one's own mind; the subjective method, because it is observation by the subject himself of the states and processes of the subject; the method of self-consciousness, because founded on the *self's* consciousness of what is going on within itself; and the analytical method because it analyses the states and processes of mind. And it is clear that all mental science must rest ultimately upon this method, because it is only by observing them first in one's self, that any one can ever come to know what mind and mental phenomena are.

Objections have been raised against the subjective method by Comte and others. Mental states, they say, cannot be observed and studied when present in their original and proper form. Such observation would imply that the mind can do two things at the same time. Thus, it would be engaged in the activity and state to be observed, and at the same time in the activity of observing it; which is impossible. Hence, if mental

1. The introspective method of self-observation corresponding to the subjective sphere, and giving subjective and analytical psychology.

On which all knowledge, both of mind and of other things, must ultimately rest;

But which has been objected to on the grounds that it makes mind do two things at the same time.

states can be observed at all, it can only be as reproduced in memory in the form of ideas. But the ideas of past mental states need not be like their originals, *e. g.*, the idea of a pain is not painful, nor the idea of redness, red. And in order to observe any thing, it is necessary to hold it up and keep it fixed before the mind's eye, as if it were an external object; but the mind cannot get outside of itself so as to observe itself nor what is contained in itself. Besides, all mental activity, Comte thinks must flow, like other forms of activity, outwards upon external things, not backwards upon itself. Therefore reflection is an impossible or unreliable method of observation.

But this power of reflection upon itself is supposed in all thinking alike, and the denial of it is founded on misunderstanding.

Because it is this power of reflection that makes mind to be mind.

2. And the objective method of outward observation corresponding to the objective sphere, and giving the objective mental sciences;

For it is only by observing their outward products that we can know that there

There is much confusion of thought, however, in this, (i) To be clearly conscious of a state or process is the same thing as observing it. And if it has not been observed while present, how could there be any memory or understanding of it afterwards? (ii) Further, all observation, even that of the external world, is in the first instance self-observation, *viz.*, an observing of our own sensations while they are present; because even external things can be known only through and in terms of the mental states to which they give rise. To observe a flower is to observe ourselves as having certain sensations of colour, form, touch, smell; and to know the plant is to be able to reproduce these sensations and their relations in the form of ideas. (iii) Finally, though physical activities proceed outwards upon other things, the activity of consciousness is, by its very nature, the opposite of this; it is essentially a *reflection* or turning inwards upon self—an awareness of self and of what self is doing; and it is this power of reflection upon itself, or self-consciousness, that makes mind to be different from nature, and to be the self-contained, individual reality which it is—in other words, to be "being for self" (as non-mental things exist for others, so to speak, and not for themselves).

§ 38.

2. The method of objective observation consists in looking outwards, and observing the external manifestations of the minds of other beings, and inferring their mental states and processes from their manifestations and products in the external world.

For we cannot observe the minds of others in the same way as we observe our own. Our own mental states are directly present to us in our self-consciousness; but the states of other minds, and the very fact that other beings have minds at all, can be known to us only indirectly, *i. e.* by inference; and the premisses from which we infer the existence of other

minds are the effects produced by minds on external things. Thus we find that our own feelings, thoughts, reasoning powers, and volitions embody and express themselves in certain outward looks and gestures, sounds, movements, actions, and works. And wherever we observe the same outward expressions, actions, and products in others, we know by inference both the fact that they have minds like ourselves, and the states, processes, and general character of their minds. And by this indirect method we can observe and understand not only the minds of our fellow men, but to some extent those of animals also.

Hence there will be as many departments of objective mental science as there are classes of external manifestations and products through which the minds of other beings may be understood. It will begin with—

(1) The observation by every man for himself of the looks, words, actions, and productions of his fellow men *individually*, as manifested to himself in his own experience of men, or as recorded in biography and history; from which he is able to judge the working of their minds, their intellectual powers, dispositions, and characters. Thus it is by continuous observation of this kind that the gradual development of mind and character can be traced in children, and the conditions discovered, to some extent, on which it depends (child psychology). The psychologist, therefore, depends largely on such observation of others.

Animal psychology also, which attempts to understand and trace the development of mind in the lower animals, must depend on such observation of their outward habits and works, combined with the study of their brains and nervous systems; and some think that knowledge of the animal mind thus acquired may cast some light upon the origin and development of the human mind. From this elementary kind of observation mental science will rise to—

(2) The systematic study of the *collective* minds of nations as expressed in their history and achievements, manners and customs, institutions and laws; because these things are external manifestations of the mind of a nation working collectively, and in these the psychologist can read the character and development of the national mind, from the primitive childishness of the barbarous state up to civilization and

are other minds than our own.

Hence different forms of mental science founded on external observation;

Observation of one's fellow men *individually*.

Of children,

And of animals;

Observation of the actions of men collectively in history and politics;

refinement—(Race or national psychology). The philosophy of history, and the sciences of sociology and politics are based on observation of this kind.

Observation
of the external
products
of mind in
arts, languag-
es, litera-
tures ;

(3) The study of the permanent *external products* of the minds of individuals and nations, which are lasting embodiments of their thought, feelings, and character.

This will include the study of *works of art*, e. g., the remaining buildings and sculptures of ancient Egypt, Greece, and India; of the *languages* of nations, for their minds are reflected to some extent even in their forms of speech; of their *mythologies* and *religions*, because these express the intellectual and moral character of a people; and, in the case of the higher peoples, of their *literature*—"that seasoned life of man preserved and stored up in books, which preserve as in a vial the purest efficacy and abstraction of that living intellect that hid them." Hence the science of aesthetics, archaeology, comparative philology and literature, mythology and religion, must be regarded as branches of mental science, because in them physical research only supplies materials for psychological conclusions.

Studies
which rest on
analytical
psychology
and rise into
philosophy ;

It is to be observed, at the same time, that these studies on the one side have their bases in subjective psychology, and on the other lead on to questions of metaphysic. Thus the science of art (aesthetics) depends ultimately on subjective analysis of the mental processes in which the feeling and appreciation of the beautiful consist (aesthetic sentiment) and lead on to metaphysical consideration of the ultimate reasons why such and such things should seem beautiful. The study of religion supposes not only the study of the outward aspects of particular religions, but also analysis of the feelings and ideas involved in all religion, which is the *psychology* of religion; and leads on to the question of the truth of these ideas, i. e., their correspondence to objective reality, which is the *metaphysic* of religion. Even so ethics has its psychology and its metaphysic.

Observation
of the ways
in which
mind embo-
dies and
expresses it-
self in organ-
ism.

(4) The study of the different *organic states and processes* which (according to the principle of concomitance) accompany the different stages and processes of mind. And the organic processes which are most directly concomitant with those of mind, are the processes of the brain, nerves, and organs of sense. Hence the study of these organs and their processes will be an essential part of objective psychology.

and is now much cultivated under the name of *physiological psychology*; though it must be admitted that it is rather the *structure* of the organs (nerves, cells and ganglia) than the processes performed by them, that it has succeeded in elucidating for the precise physical processes which most closely correspond to mental ones, and the link of connection between the one series and the other, still remain obscure.

And closely connected with this is the class of experimental researches known by the name of *psychophysics*, which attempt to apply measurement to the processes of mind by first applying it to their physical concomitants.

Thus stimuli of different degrees of intensity may be applied in order to determine what degree of sensation follows upon a particular degree of physical stimulation. Objects may be presented to sight under many different circumstances in order to ascertain how it is that we perceive the distance, size and shape of things by means of vision. A limb may be stimulated in order to ascertain the time needed to transfer the stimulus to the brain and produce sensation; and that needed to move the limb to escape from the stimulus, as when one is pricked or tickled—the time needed for sensation and reflex reaction. A command may be given to do something, in order to ascertain the time between the stimulus and the action—the time needed for hearing the sound, understanding its meaning, determining to act so and so in response, and producing the requisite movements. Instruments of extreme delicacy have been invented, for experiments of this kind; laboratories have been constructed, and elaborate tables of results have been drawn up; and many think that by this means a "new psychology" will be created.

And of the temporal and quantitative relations of mental and physical processes—the "new psychology."

Or psychophysics.

* But neither the *subjective* nor the *objective* method is sufficiently by itself; mental science requires the combination of both.

This follows from the very nature of scientific knowledge itself; for proposition (knowledge), in order to be *scientific*, must be (i) *certain*—thus the proposition that "thunder is occasioned by an electrical discharge" is certain and scientific, but the proposition that "light is an electrical phenomenon" is not yet a scientific affirmation, because not yet certain; (ii) *accurate*—thus the proposition that "it rains every day in July," is not a scientific truth, because it is not accurate, but

But both methods are necessary to give a scientific character to knowledge of mind, and therefore each supposes the other,

For scientific knowledge of mind has three characteristics, in which both methods are required.

if we were to take the number of rainy days in that month every year for a century, and to take the average of these, then the proposition that "it rains so many days on the average," would be a scientific conclusion: and (iii) *general*—that is, they must not be merely singular propositions, true only of particular individual things or occurrences, but must be true of whole species or classes; thus "*A* is a good-natured person" is not a *scientific* truth, because it applies only to an individual; but "*A*'s mind is made up of the three correlative processes of feeling, thinking, and willing" is scientific, because it expresses what is true of the whole class of things called minds.

It follows from these conditions of scientific knowledge that both methods are necessary to make psychology a *science*. For in the first place—

Why the subjective method is required.

(1) The *subjective* or *introspective* method is necessary, because we should never know that mind and mental states and processes are, except by being conscious of them, and observing them in ourselves; and we can read and interpret the external manifestation and products of other people's mental states and processes (*objective observation*) only after we have been conscious of such states and processes in ourselves, by *subjective observation*.

Thus, a man who has been born blind or deaf can form no idea of what colour or sound is, because he has had no experience of them in his own consciousness; a being who had never himself experienced pain would be unable to interpret the manifestation of pain in other beings, e. g., a child may torture a young animal and laugh at its contortions and cries because he has had no experience of such pains as he is inflicting on the animal; and the more varied and intense our own mental states and experiences have been, the more correctly can we interpret and understand those of others.

Why the objective method is required.

(2) But the *objective method* also is *indispensable*, because our own mind is only *one*, and we should never, by observing it alone, come to know accurately what is true of mind *generally*. But knowledge of mind, to be scientific, must not only be certain and accurate, but must be true of mind generally—it must be general knowledge—and knowledge of other minds can be arrived at only by supplementing the subjective method with the objective one, which shows that

other minds have the same ideas, feelings and activities, and are subject to the same laws and conditions as ourselves.

But *each of these psychological methods has its own peculiar difficulty*—

(a) The *subjective method* has this difficulty especially, that to employ it rightly requires exceptional power of intellectual "abstraction". In order to observe a mental process with the certainty and accuracy which scientific method requires, it is necessary to isolate it in thought from other mental processes, and concentrate the attention upon it by itself. But this is difficult to do, because mind at every moment is a complex of states and processes, going on simultaneously or in quick succession, and each depending more or less upon all the rest. This makes it difficult to fix the attention upon any one to the exclusion of the rest, so as to obtain a clear and accurate conception of that one by itself. Thus, concrete sights, sounds, and emotions are always tending to draw away the attention from abstract ideas, and absorb it in themselves.

But subjective study requires exceptional power of abstraction;

(b) The *objective method*, again, has this difficulty especially, that we have a tendency to fancy always that other people must feel and think about things in the same way as we ourselves do; and hence to judge the minds of other people too much according to the standard of our own, which is the 'psychological' fallacy.

And objective study of mind involves the difficulty of entering into the minds of other people;

Hence it is that children have difficulty in understanding the ideas, feelings, and conduct of grown-up people because they have not yet experienced them; while the latter find it hard to understand those of children because they have long forgotten them; and one nation is apt to misunderstand another nation, especially when far removed from itself in place and time.

Hence to understand the minds of other people, it is necessary.

(a) To consider carefully their external manifestations—where they agree with, and how they differ from, those of our own minds; and

And therefore requires exceptional power of mental reconstruction.

(b) To be possessed of considerable power of *imagination*, *i. e.*, power of putting together elements from our own past experience in new combinations, so as to form conceptions of circumstances and mental states more or less different from any that we ourselves have experienced—because the circumstances and states of other minds always differ more or less from our own.

VII

FUNCTIONS OF MIND.

§ 40.

All know-
ledge of mind
rests ulti-
mately on
subjective ob-
servation and
the introspec-
tive method.

And obser-
vation reveals
three consti-
tuent factors
as entering
into every
concrete men-
tal process.

But of these
one always
predominates
over the
others for the
time being.

Hence these
factors
may be taken
as the basis
of a three-
fold division
of conscious
mind into

Complexity of Mind: We have found that psychology divides mental phenomena into internal and external, subjective and objective; but we have found also that the so-called *objective* mental phenomena are mental in the sense that they manifest to us the *subjective* phenomena of other minds. Hence all mental science supposes and rests ultimately upon the psychology of *subjective* mind by the method of introspection.

Now the subjective mental life consists in the series of conscious activities in which the mental principle manifests itself to itself and becomes aware of itself, and which every individual is aware of within himself. Consciousness, however, is never simple, but made up, as we have found already, of three correlative factors—conscious *activity* or *effort* by which the mental principle strives to preserve itself in interaction with the world of things in the midst of which it is placed; conscious *affection*, or *feeling*, agreeable and disagreeable, of the ways in which it is affected for better or worse by things and its changing relations to them; and conscious *thought*, *knowledge* and *understanding*, *viz.*, of the realities manifested in these changing states, and therefore of the *self* as the *subject* of them, and of the *not-self* as *implied* in them (*viz.* as their occasion or cause). Thus the self consciously *acts* to preserve itself, *feels* its states as agreeable or disagreeable, and *thinks* in order to regulate its actions, better its states, and perfect itself.

Hence these three elements of *action* or *striving*, *feeling*, and *knowing* or *thinking*, are evidently contained as correlative factors in every phase of consciousness; and in such a way that all three depend on one another reciprocally, and that consciousness itself results from the co-operation, so to speak, of all three. Now it is on this apparent *triplicity* of consciousness that the common *tripartite* classification of mental phenomena is based. For we find that, though all

three factors are always present in consciousness simultaneously, they differ in their relative degrees, and one factor usually predominates over the others, and determines the form of consciousness for the time being. Thus—

(i) At one moment, we may be so engrossed with *feeling, passion or emotion* (especially when it takes the extreme forms of pleasure and pain) that both *thought* and *action* are depressed for a time;

(ii) At another moment, we may become too much absorbed in *thinking* (i.e., in trying to interpret and understand our feelings and sensations) either to *feel* deeply, or to *act* promptly;

(iii) And at another, we may throw ourselves so exclusively into *effort* or *action* in order to escape from a disagreeable, and maintain or recover an agreeable state of *feeling*, that both *feeling* and *thought* are reduced to a minimum for the time being

Hence the new common division of mental processes into three classes or departments seems sufficiently well grounded in the nature of mind and its relations to the world; but it must not be understood as implying that consciousness is wholly employed for a time with one class, and then abandons it, and enters upon another. Rather they all go on simultaneously, but some one always predominates in intensity over the others and gives its own colouring to the whole for the moment. Hence mind may be engaged at one moment in *thought* mainly, at another in *feeling* or *emotion* mainly, and at another in *volition* mainly, while, of these fundamental functions themselves, each assumes different forms.

§ 41.

Three factors of Mind. We may therefore distinguish the three main classes of mental processes according to the fundamental function which is predominant in each. Thus

Hence the tripartite division of mind.—

Feeling

I. Consciousness includes the self's awareness of being *affected, acted on, or limited* by the surrounding world; and *Affection* or *Feeling* (in the wider sense of the word) is that kind of consciousness which arises from the different ways in which the self is *acted on* and *affected* by the surrounding world, and by its own efforts of reaction upon the world, and by

I. Feeling, or the consciousness of being affected,—

the knowledge of the world which it has acquired by thought; and is distinguished as *agreeable* or *disagreeable*, and, in extreme cases, as *pleasurable* or *painful*, according as the changes of states thus imposed on the self are for the better or worse.

Which rises from the different ways in which mind is affected or acted on.

Thus the self is placed in the midst of a world of things, and is limited, acted on, affected by the world at every moment *from without*, through the medium of its own organism; and is, every moment, reacting for its own preservation, and its efforts of reaction are continually affecting itself and its organism *from within*; and the consciousness of being *affected* in these various ways is what is commonly called *feeling*.

And may be considered the material on which conscious mind works, and in terms of which it knows the world and itself;

Feeling in this sense, then, would seem to be the primitive and fundamental form of consciousness—its crude material, so to speak—and that in which the other two factors, *viz.*, intellect and volition, are at first latent, implicit, potential, and from which they have to be differentiated and developed gradually. (For though we can hardly ascribe *explicit* thought and will to the lowest animals, we cannot deny them the possession of pleasurable and painful sensibility in some degree.) And it is only in terms of the feelings, which external things occasion in mind, that mind is able to represent or picture to itself external things.

And may be pleasurable or painful, but is itself something more than mere consciousness of pleasure and pain.

For this reason, then, that feeling is the very essence of consciousness, it is impossible to define, or even describe it to any purpose. Its nature is merely to be *felt*, and every one feels it for himself, but cannot define it to another. Some, indeed, have gone so far as to identify it wholly with pleasure and pain, as if these were the essence of feeling, and its different forms were but different degrees and modifications of pleasure and pain. But pleasure and pain are themselves extreme and opposite states; and suppose intermediate forms of consciousness which are not distinctly either pleasurable or painful. Rather pleasure and pain are either merely qualities of feeling, or extreme forms into which feeling tends to rise and fall.

But mind may be affected in two ways, giving two classes of feelings;

The above definition of feeling as the self's consciousness of being *affected* or acted on, and the above distinction between being affected from *without* and from *within*, suggest a division of feelings into two classes *viz.*, sensations and emotions.

(1) By things external to itself, giving the affections called sensations, through which it

1. The *primary* feelings or *sensations* are elementary forms of consciousness rising out of those changing states of the self which are occasioned directly by changing states of extra-mental things (directly by those of the organism, less directly by those of extra-organic things affecting mind

through the organism). Thus sensations of resistance, hardness, weight, heat and cold, colour, sound and the like, are affections of the self occasioned by corresponding states and qualities of things affecting the self through the medium of the organism, and we know the existence and qualities of the things through the medium of the sensations.

And these impressions from without are felt as pleasurable or painful according as the states of the self to which they give rise are beneficial or otherwise. But as they are occasioned by states and changes of external things, they reveal, and, while they are themselves conscious mental states, they in a sense represent the qualities and states of things ; and are thus the means through which the self knows external things. Hence we shall have to show afterwards that every sense-affection contains (1) an *intellectual* or *presentative* element which enables us to know and think the existence and quality of the external thing, and represents it to us in terms of our own consciousness : and (2) an *aesthetic* element of agreeable or disagreeable feeling, according to the way in which we are affected. The other class of feelings which may be called

2. The *secondary feelings* or *emotions* belong to a higher phase of mental development than sensations, being the feelings caused in the mind by the ideas and beliefs which rise out of the *knowledge* of things derived from sensations. Thus sensations are forced upon the mind from *without*, in consequence of its changing relations with the external world. They set the mind working intellectually, and by its intellectual processes of perception, memory and reasoning, the self derives from its sensations the knowledge of the existence and qualities of things. The knowledge of things thus derived gives rise to a new class of feelings, *viz.*, the *emotions* such as fear, anger, hope, gratitude. Thus an external thing gives rise to certain sensations in us, perhaps of colour, form, sound, motion. From these sensations we know the existence and character of the thing, and form an idea of it. Our knowledge of the thing (the idea and belief within our mind) at once gives rise to certain feelings, perhaps of fear, or anger or wonder or admiration. Feelings produced in this way (*i. e.* by knowing and thinking about things) are *emotions*. We may say that they are produced from *within* because they are caused by our thinking about things—by ideas and beliefs. Thus, as we may speak of sensations as *primary feelings* because they

knows the existence and attributes of the external world,

And in terms of which it forms its ideas of external things.

(2) By its own operations and products *i.e.*, by the ideas and beliefs which it derives by interpretation of its sensations,

precede thinking, and supply the materials for knowledge, so we may call the emotions *secondary* because they follow thinking, being produced by it. Both classes are *affections*. But in sensation the self is *affected* by the *external things with which it comes into relation*. In emotion, it is affected by the *products of its own thought*.

Giving the
affections
called emo-
tions.

Thus thinking about dangers occasions fears ; about future successes, hope or ambition ; about past achievements, pride ; about injuries and benefits, anger and gratitude. These feelings are occasioned by thinking, and are therefore emotions. Hence the emotions are such feelings as fear, anger, hope, jealousy, sympathy, reverence, ambition, envy, wonder, pride. As they rise out of ideas and beliefs, whether true or false, they suppose a comparatively developed power of thinking and reasoning, remembering, reflecting and drawing inferences ; and are agreeable or disagreeable according as the things believed in are favourable or otherwise to the ends and aspirations of the self.

§ 42.

Intellect.

II. Intellec-
tion—the con-
scious acti-
vity of dis-
criminating
and interpre-
ting the
materials
supplied by
feeling, and
applying
them as
means by
which to
know the
things which
occasion
them,

Including
discrimina-
tion,

Under-
standing,

Memory, and
Imagination,

And
Reasoning,

II.—Consciousness includes the self's awareness of its own activity in *distinguishing* and *interpreting* the different ways in which it is affected by things, and in using the affections impressed upon it by things, as means for arriving at knowledge of things. This is *Thinking*, *Intellection*, or *Cognition*, —that conscious activity of the self which consists in *distinguishing* the different elements of sensation and feeling, *apprehending* through them the things and qualities and relations of the things underlying and manifested in them, and in using the sensations and feelings impressed upon it by the surrounding world as means and materials for arriving at knowledge of the world and of itself. It follows that intellect will include the self's powers of *discriminating* or *differentiating* different kinds and degrees of sensation and feeling ; of *interpreting* or *understanding* its sensations as manifestations of, and as therefore representing, forms and qualities of things ; of *retaining* and *reproducing* them in the form of mental images, and integrating them into *ideas* of things and classes of things ; and of *reasoning* from present things to the things past, distant and future, thus arriving at a knowledge and understanding of the world as a whole. These

are its principal phases or applications; but the essence of it evidently consists in distinguishing the different elements of sensation, and apprehending the realities revealed in them.

Thus, in rational beings, every affection of mind is accompanied by some activity of intellect or understanding. A pain is discriminated from other conscious states, and interpreted as meaning injury of some part of the body; a sound is distinguished from other sounds, and understood as implying a sounding object external to self; sweetness, as implying the presence of a soluble substance in the mouth; colour, as implying an object reflecting light, resistance, an object occupying space, and so on. And the impressions thus distinguished from one another (discrimination) and understood as phenomena or manifestations of things (perception), are retained and combined together into ideas of things and classes of things (memory and classification); and these again are built up into a collective conception of the world (reasoning). This complicate process of discriminating, and putting together sensations, and building them up into ideas, and understanding them as corresponding to a world, is *intellection*, or working of intellect.

It is evident, therefore, that intellection is an extremely complex process. (Indeed, it is so complex that no psychologist or logician has succeeded in explaining all that is involved in it). In attempting to analyse it, we have first to consider the *essential factors* or *functions* which make it to be intellect, and therefore reappear in different forms in all the different stages and applications of intellect; and then these different *stages* and *applications* themselves, called the *intellectual faculties*, which will require more detailed consideration afterwards. Hence—

By which every sensation is interpreted as meaning or revealing something.

But analysis of intellectual work reveals three constituent factors, and various applications of these :—

1. *Factors.*

1. As to the essential functions which constitute the essence of intellection and therefore enter into all its operations—these may be reckoned as three, viz., *discrimination* with its correlative, *assimilation*; *apprehension* or *understanding*; and *conservation* including memory and imagination. Thus—

(a) Discrimination and assimilation are the activities of distinguishing differences and agreements contained in the elements of sensation, and in the higher processes and products of thought, e.g., distinguishing the different kinds and degrees

1. The essential factors included in all intellectual work are—

(a) The discerning of differences and similarities among sensations;

of feeling as temperature, weight, colour, taste, smell, etc. They are essentially, however, parts of one and the same process, because difference and likeness always go together—so that we understand the one by contrast with the other (e.g., the various colours differ so much that they can be discriminated from one another, and at the same time they all agree in this, that they are colours); and enter not only into the most elementary consciousness (as implied in the law of Relativity), but into the highest operations of thought. Thus—

For all consciousness necessarily involves discrimination of differences;

Discrimination and *differentiation* (in some forms called *analysis*) consists in the discerning of differences, first between different qualities and degrees of sensation, and afterwards between the ideas which are constructed out of these materials, and the things which are known through them. A consciousness of one continuous state without plurality, change, or difference, would be impossible; for example, a creature living in unchanging darkness would have no consciousness of darkness. Consciousness, therefore, supposes plurality of materials, and differences of units, qualities and degrees, as the conditions of its possibility; and the primordial factor of intellection will be the activity of discriminating these differences, and thereby distinguishing the things and qualities of things which give rise to them.

And this is necessarily accompanied by assimilation, or awareness of likenesses.

Assimilation, again, may be used for the becoming aware of *similarities*, likenesses, agreements, between the different units and qualities of sensation. For wherever there are differences between things, there are also similarities or communities of kind. Things cannot be said to differ, unless there is something common to them all in respect of which they differ. Hence we cannot discern differences (or at least realise clearly the meaning of difference) without at the same time discerning similarities, and contrasting them with the differences; to that the discerning of differences and of agreements seem to be but two factors of one and the same process.

Thus even between light and darkness there is this community of kind, that they affect us through one organ, and one kind of sensation, *viz.* vision. Mercy and cruelty, though opposite in one sense, yet agree in another, *viz.*, in being both qualities of will and character. Hardness and roughness agree in being affections of tactful sensibility. Similarity, therefore, will be found to be the special ground of classification, generalisation,

abstraction, and reasoning (though always in conjunction with discrimination of differences).

(b) *Apprehension or understanding* is primarily the self's power of discerning the *meanings* of its own sensations, feelings and ideas, *i. e.*, discerning what is manifested and implied in them. Thus sense-experience always implies and reveals something beyond itself. It implies a subject which has the experience, and a ground or cause which gives rise to the experience; and it implies at the same time the possibility of other experiences connected with it, so that from a past or present experience we can infer a future one. Thus experience would be of no use to us if we had not this power of discerning what is thus revealed or implied in it.

This power, then, of discerning the meanings and connections of the feelings imposed upon us, is essentially what is meant by *understanding or intelligence*. We must regard it as the differentiating attribute which distinguishes rational from lower forms of mind. Knowledge does not consist in multiplying sensations, but in apprehending their meanings. The lower animals have as many and apparently as vivid sensations as men, but differ in this, that they want this power of interpreting their meanings, or understanding what they mean.

And this power of understanding appears especially in the two fundamental cognitions, *viz.*, *self-consciousness* or internal perception, in which the self apprehends itself as subject and agent of conscious states and acts, and understands their relations as functions of itself, and *other-consciousness* or external perception, in which it apprehends another reality—not-self—as the external occasion and ground of its sensations and activities, and understands its sensations as manifesting therefore the qualities and relations of external things; and in the power of reasoning by which, from present experiences, we can know past, distant and future things, and rise to knowledge of the world in which we live.

Indeed understanding may be said to consist essentially in applying the fundamental notions of *substance* and *attribute*, and *cause* and *effect*, of which animals have no clear apprehension; because it is by applying these ideas that we are able to interpret sensations as manifestations of a world of real things acting and reacting on one another in space and time, and to draw inferences from what has happened in the past to what will happen in the future.

(c) *Conservation* is the self's power of retaining and incorporating, its impressions and cognitions into its own system,

(b) Under-standing the meanings of sensations and of their differences and likenesses;

As in under-standing the distinction between self and its qualities,

And not-self with its qualities—

i. e. between substance and attributes, cause and effects.

(c) Preserving and reproducing the re-

sults of past
mental work
as material of
knowledge ;

making them a part of its own constitution ; and of raising them (in same cases) into clear consciousness again, *viz.*, in the form of ideas of *memory* and *imagination*. Only some experiences, indeed, are revived as distinct ideas (*i. e.* remembered) ; but there is reason to believe that all past experiences are retained as at least sub-conscious constituents of mind, and go to determine its general character, and modify collectively its future thought, feeling and volition.

Which mind
does by
integrating
them toge-
ther, and in-
corporating
them into
itself, which
is memory ;

This conservation and partial revival of cognitions, so essential to mind, can be explained as a tendency to *growth* and *self-development*, which may be compared with the growth of the bodily organism. As the life working in the body incorporates more and more materials from the outside, and builds them up into cells, organs and limbs ; so the mental principle incorporates new materials and differentiates new powers of knowledge and builds them up into a mental organism. And this process of mental acquisition proceeds partly by the above power of—

And inte-
gration is ac-
complished
by blending
similar im-
pressions ;

(i) *Amalgamation* or *Assimilation*, by which impressions which are *similar* to one another and thus far identical in kind, become *fused* together into one compound impression constituting a general or class idea, in which the results of many experiences are blended and preserved ; as, for example, the many horses or crows that I have seen, become amalgamated in my thought into one general idea of horse or crow. This process is also called *assimilation* because, in it, mind fuses together many ideas into one, on the ground of their similarity. *Assimilation* helps memory in this way : we do not need to retain an idea of every individual horse or crow we have ever seen ; we retain only the general idea of what is common to all horses and crows. And partly by power of—

And asso-
ciating con-
tiguous ones

(ii) *Association*, by which impressions that are *not similar* in kind, but occur in experience either together or in close succession so as to form one cluster or series of impressions, become *colligated* together in thought so as to form a corresponding cluster or series of ideas. Thus, the touch, colour, shape, taste, and smell of a particular fruit, being always experienced together, are associated together by the thinking power into one complex idea, and remembered together as qualities of one thing ; and the events of a day,

having been experienced in a continuous series, are connected together by thought, and remembered as a train of events.

It is by these processes, then, of amalgamation and association, that past experiences are preserved in the mind, and afterwards remembered, i.e., revived in the form of ideas and trains of ideas; and memory makes knowledge and understanding possible. And the conservation of impressions in the mind in the form of ideas has some analogy, it may be observed, to the conservation of forces in nature. We know that a physical force which has once operated is never lost, but, though latent in potential form for a time, may re-appear actively at another time. So a cognition once incorporated into the mental system is, we may safely assume, never lost, but, even when not revived as a distinct idea, helps sub-consciously to determine the character of the mind as a whole.

Thereby
making me-
mory and im-
agination
possible.

Thus, (1) through its function of *discrimination* the self analyses its states and experiences into their constituent elements and parts, and raises them into clear consciousness. (2) Through its function of *apprehension* it understands them as expressing and manifesting substantial realities, and thereby comes to understand self and not-self as a world of concrete things (substances and attributes). (3) And through its function of *conservation* (by amalgamation and association) it makes the cognitions thus acquired to be its own permanent property, incorporating them into its own mental constitution, and making them the means of anticipating the future by exercise of reasoning.

Hence the
three essen-
tial factors of
intellect.

But to purely sensationist psychology, it may be observed, the functions of intellect are simply *discrimination*, *amalgamation* and *association*. It assumes that no special function of apprehension or understanding is needed. Knowledge is formed by the accumulation of sensations, the automatic association of simultaneous ones and similar ones into clusters (called things), and the automatic fusion of these into general and abstract ideas by amalgamation (see *Experience and Reason*).

But of these,
understand-
ing is not re-
cognised as a
fundamental
factor by the
sensationist
school.

Stages of Intellect.

2. As to the *applications, stages or phases* of intellectual work (sometimes called the 'faculties' of intellect), by which the mind rises from the elementary discrimination of different kinds and degrees of sensibility up to knowledge of the world, —these will include

2. The
lower and
higher stages
of intellectual
work in-
clude—

(a) Acquisition of materials for knowledge :

Sensation and

Perception :

(b) Conservation of materials :

Memory and

Imagination :

(c) And elaboration of materials into completed knowledge,

By judgment classification and reasoning.

(a) Faculties of *acquisition*, by which those elementary materials or data of knowledge are acquired, out of which higher knowledge has to be elaborated by higher forms of intellectual work. Hence acquisition will include—

(i) *Sensation* or primary feeling, the states of consciousness which external things occasion in the mind, and which therefore supply elementary materials from which we derive knowledge of external things; and—

(ii) *Perception* or elementary cognition, in which mind apprehends the realities manifested in its sensations, or understands its sensations as manifestations of reality. Thus when we experience a sensation of touch, colour or sound, we *perceive* that there is an external something which causes the sensation; and that it has the qualities of being hard or soft, black or white, etc., according to the kind of sensation it gives. And perception includes *internal* perception, in which mind apprehends itself as subject of sensations, and *external* perception, in which it apprehends a not-self, or external world as the occasion or cause of sensations.

(b) *Faculties of conservation and reproduction*, or the processes of retaining the results of perception as permanent contents of the mental system, and reproducing or reviving them in the form of mental images, representations, or ideas. And reproduction in the form of ideas takes the two forms of—

(i) *Memory*, which supposes former percepts or experiences of things, and consists in retaining them in the mind and afterwards reviving them in the form of mental images or ideas, when the things themselves are no longer present; and

(ii) *Construction or imagination* which supposes images or ideas of memory, and consists in re-constructing them into new forms and combinations different from any actually perceived by ourselves.

(c) *Faculties of elaboration or logical thought*, which suppose the concrete ideas of particular things that have been acquired through sensation and perception, and, preserved and reproduced in memory, and modified perhaps in imagination; and consists in reducing particular ideas to general ideas, and using these as *means* of extending our knowledge beyond the range of actual perception and memory, to things past, distant and future which we have never perceived at all; thus rising above the limited sphere of our own personal experience to knowledge of the world as a whole.

Hence the elaborative processes include *judgment, classification and reasoning*. But these processes may be performed

correctly or incorrectly, and therefore the conclusions to which they lead may be true or false. Hence a special study is needed to determine how they may be performed correctly so as to lead to true conclusions. This special study is called Logic.

§ 43.

Conation.

III. Finally, consciousness includes the awareness of *putting forth effort or energy* to produce and regulate the operations of thinking and the movements of the body, so as to avoid harmful and attain to beneficial states, and thereby preserve and perfect the thinking self. Hence *Conation* or *Willing* (in the widest sense of that word) is *effort* by which the mental principle strives to preserve its own existence in interaction with other forms of being ; to adapt itself to continually changing circumstances and its circumstances to itself, and to develop and perfect itself as a personal self-conscious being. And conation manifests itself in consciousness, indirectly indeed through the changes of state which it produces, but also directly in the peculiar consciousness which it gives of putting forth *energy* or exercising *effort* and *activity*. For the difference between this consciousness of *acting* and that of being *acted on* (viz. sensation)—of *activity* and *passivity*,—is the most radical in all our experience ; because, while sensation reveals the self as subject of passive sensibility or feeling merely, affected and limited by other things, conation reveals it as a centre of self-adjusting, self-developing *activity*, reacting upon other things, and adapting them to its own advantage, *i.e.*, as an active *voluntary agent*. Thus

(a) By continual effort directed outwards into its organism, the self controls its organism, moves its limbs, and adapts itself to the external world by changing its position in relation to things, and adapts the world to itself by producing changes in things, and adapting them for its own benefit ; thereby avoiding such relations as are injurious and painful to itself, and attaining and prolonging such as are beneficial and pleasurable (*physical effort*). And,

(b) By effort of concentration directed inwards upon its own contents, it exercises and regulates its intellectual power in such a way so as to obtain knowledge of the world, and thereby be better able to adapt itself to it, and it to itself (*intellectual*

III.
Conation or
conscious
effort to pre-
serve and
perfect one's
self in inter-
action with
the world ;

Implying
that the
mental prin-
ciple is not a
passive pro-
duct, but a
principle of
activity :

As in the
effort to
resist and
produce
changes in
things, which
is motor
activity,

And the
effort to un-
derstand and
remember
things, which
is subjective

mental activity.

Whence some have thought Will to be itself the essence of mind, and the other factors to be inessential.

Two ways of dividing conation —

1. According to origin and mode of operation — giving (a) automatic effort and

(b) Intentional effort, or will proper.

2. And according to the purpose to which it is automatically or intentionally applied, giving —

effort, or *attention*). (And we may go so far as to suppose that it is by sub-conscious effort that it raises its own changing sub-conscious states into the light of consciousness, *viz.*, in memory, in order to distinguish between what is beneficial ~~and~~ what is injurious, and be able to attain the one and avoid the other).

This has led the metaphysician Schopenhauer and others to make Will (taken in this wide sense of *effort* or *striving*) to be the very essence of mind, and the other factors, sensibility and thought, to be only auxiliary. But it is obvious that without conscious sensibility and discrimination of sensibility, and without memory of the past and anticipation of the future, will would be only blind automatic force, and not really a function of *mind*, which supposes the co-operation of all the three factors. And further, effort of self-preservation is not limited to mind. All things, resist other things, and maintain their own existence. What distinguishes mind is that it does so consciously, and directs its actions rationally, or by means of ideas. Therefore there can be no will without intellect.

Forms of conation.—Now the work of conation or volition may be sub-divided according to two principles of division— according to the *ways in which it operates*, and according to the *directions* in which it is turned, or *purposes* for which it is applied. Thus

1. According to the *ways* in which it operates — it may operate

(a) *Automatically*, *i. e.*, without any clear consciousness of the *end* or *purpose* for which it is operating, and therefore without any distinct desire or intention. That is, conation or effort may be *spontaneous*, *automatic*, *unintentional* effort. And in this primitive form it includes (besides sub-conscious efforts) the conscious forms distinguished as *spontaneous* or *random*, *reflex*, and *instinctive* activities, and in a sense also *secondarily automatic* actions, or habits.

(b) Or consciously and *purposely*, *i. e.*, with full consciousness not only of the activity, but of the object and purpose to which it is directed, and explicit desire and intention to attain that object. This latter form of conation is *will* in the narrower and stricter sense of the word; and is the sense in which the word is used in ethics, and when we speak of free will.

2. And according to the *direction* in which it is turned, or *purpose for which* it is applied — for it is clear from the above that effort of will may take two directions, so to speak, and perform two apparently different functions. Thus—

(a) It may take the form of *attention*, i. e., effort of thought, or trying to think; in other words it may turn *inwards*, and remain within the compass of the mental system itself, and take the form of intellectual energy applied to the purpose of thinking and reasoning. In this case, it will consist in intensifying the intellectual activity, and concentrating it upon some sensation, percept, or idea in order to discriminate and assimilate it more clearly, and integrate it more closely with other ideas, and thereby remember it better, and apply it for purposes of reasoning. This application of will to thought within the limits of the mind itself, is called *attention*, and keeps up the work, which is continually going on, of elaborating sense-materials into knowledge.

(a) Effort to regulate thought for the acquisition of knowledge;

(b) It may take the form of *movement*, or *trying to move*, i. e., it may turn *outwards*, and give rise to a discharge of force along outgoing nerves to contract the muscles, move the limbs, and produce changes in external things; whether for the realisation of desires, intentions, purpose of the mind (*purposive action*), or from blind instinctive impulse (*automatic action*).

(b) And effort to move the limbs and produce changes in external things.

It is this motor effort that is commonly thought of (when it is purposive) as volition, action, conduct, in the strict sense of the words; but from a psychological point of view, it does not differ essentially from the inward application of effort to thought, i. e., attention. It is true however, that this application of active effort to external movement is always accompanied and distinguished in consciousness, by *passive feelings*, (i. e., sensations) arising from the tension and fatigue of the muscles and limbs, but these passive feelings of heat and fatigue are clearly distinguished from the consciousness of effort.

But the above two functions of conation are less opposed to each other than they seem; for it is found that, as for every process of mind there is a corresponding physical process, so for every *inward effort of attention* there is an *outward physical effort*, and *vice-versa*. Thus—

But each of these kinds of effort supposes the other.

(1) Even in the *internal effort* of concentrating and fixing the intellectual activity upon an object of observation or thought, there is a corresponding muscular effort to turn and steady the body, and direct the organs of sense upon the object; and even when the object of attention is but a idea within the mind, e. g., a diagram or a piece of music represented in idea, we are clearly conscious of an effort of the same

For even attention supposes muscular effort,

physical organ which originally gave the idea, and of the organ itself when the effort is prolonged, as of the hand in drawing the diagram.

And the regulation of movements supposes attention.

(2) And the *external* direction of effort, to move the limbs and produce change in external things, is always preceded and accompanied by an *internal* direction of it, *viz.*, in the form of intellectual concentration upon the object or end of the action present in idea, and upon the means and movements necessary to attain the end, which are also present in idea, (except in the case of blind instinctive action).

From this it would appear that intellectual attention and physical movement are but two phases of the same action, beginning inwardly in thought, and manifesting itself outwardly in movement.

§ 44.

Relation of feeling, thinking and willing.

The question how feeling, intellect and conation are related to one another:

They are antagonistic to one another in respect of degree,

We are now able to define more precisely *the relations to one another*, of the three fundamental functions of mind, and classes of mental processes—Feeling, Thinking and Willing. And we find that they stand to each other in two apparently contradictory kinds of relation. Thus

1. Experience shows that, in one sense, they stand to each other in a relation of *antagonism*. For though they must always be present as factors of mind, they are not present in the same *degree*. Consciousness oscillates between them, and the more full, intense, and absorbing any one of them becomes, the fainter do the others become. It seems as if 'mentality' were a constant quantity, so that the more it is absorbed by any one function, the less is left for the others.

Thus, when any strong emotion rises in the mind, such as sorrow, fear, remorse, then both intellectual *activity* and physical action sink to a minimum; the more the mind occupies itself with intellectual discrimination and thinking, the lower does the degree of feeling and physical activity sink; and by throwing itself into effort of any kind, it lowers the degree of thought and feeling.

But correlative, and mutually dependent in respect of kind:

2. But from the fact that they are all equally fundamental, it follows that their relation is, in another sense, one of *concomitance* and reciprocal *dependence*, such that no one of them can go on by itself, but each depends on the others; and that they all go on simultaneously, or in such rapid

oscillation as to be practically simultaneous—each both depending on the others, and supporting the others reciprocally. Thus—

(a) *Intellection* supposes and depends on both sensibility and conation.—(1) On *sensibility*, because there can be no intellectual discrimination without materials to discriminate and integrate, and the materials must be supplied by states imposed on the organism and self which manifest themselves in consciousness as affections or feelings, especially those called *sensations*; while intellection, again, cannot go on without itself imposing further effects on the organic and mental systems, which enter into consciousness as the secondary feelings, called *emotions*. And (2) on *conation*, because effort of attention is necessary both to keep up the intellectual activity, and to concentrate it upon definite objects of thought; and effort of movement is needed to produce new sensations as materials of thought.

For thought depends on feeling and conation,

(b) *Feeling*, or *sensibility*, again, depends on both *intellection* and *conation*.—(1) On *intellection* because there cannot be consciousness of states without intellectual discrimination of their different kinds, degrees, and qualities; while the kinds of feeling called emotions have this further dependence on intellect, that they rise out of, and are caused by previous processes of thinking and reasoning, and the ideas and beliefs to which they lead. And (2) on *conation*, because effort of attention is necessary at every moment to keep up that activity of intellectual discrimination which is necessary to keep up the consciousness of feeling; and motor effort is necessary to produce new sense-feelings; while the continual effort to keep up or escape from feelings serves to raise them into clearer consciousness.

Feeling on thought and conation,

(c) *Conation*, again, depends on both *feeling* and *thought*.—(1) On *feeling*, because conscious effort is always prompted by feeling of some kind—agreeable feeling prompting the self to effort for its continuance if present, and renewal if absent; and painful feeling prompting effort to escape from it if present, and prevent its recurrence if absent. And (2) on *intellection*, because, in its higher form, especially, it supposes that we can think other possible states besides our present one, and

And conation on thought and feeling.

judge whether our present state is better or worse than other possible ones; and can contrive lines of action which will better our condition; and these are all intellectual processes.

Thus, none of the three functions is complete in itself, but each both supports and is supported by the others reciprocally.

But the above powers and capacities of mind are at first only potential, and require to be developed.

The above is an analysis of the processes which make up the mental life as they manifest themselves in consciousness. It must not be supposed, however, that they are thus distinct and explicit from the beginning. In the lowest forms of mind they are present only *implicitly* or *potentially*. They have to be *unfolded* or developed. This unfolding of the capacities latent in mind includes, under certain circumstances, what is called education. It is of the utmost importance, therefore, to understand the laws and conditions of mental development; and much of the practical importance of psychology consists in the light which it throws on these. Hence we have to consider the meaning of development, and the circumstances which contribute to the development and education of the mind.

VIII.

THE DEVELOPMENT OF MENTAL LIFE.

§ 45.

Meaning of development.

What then is meant by development? A thing is said to develop (a) when an increase takes place not only in its *mass*, but (b) also and more especially in the number of its *parts*, and the *functions* or different kinds of work performed by the parts; and (c) in the perfection with which the parts are *co-ordinated* and made to *co-operate together* for the unity, preservation, and greater perfection of the whole; and (d) when this growth in mass, and differentiation and integration of parts and functions, is accomplished by an *energy seated within and working from within the thing itself*, drawing materials into it from without, and assigning them their proper places, and making all parts and materials work together as one *self-adjusting* and *self-preserving whole*.

Thus development consists in the two correlative processes of *differentiation*, or the production of differences in parts and the functions performed by them, and *integration*, or the co-ordination of these parts and functions so as to make them support one another reciprocally, and thereby constitute one complex whole—a unity in plurality—and this, by a power within, adjusting itself more and more perfectly to its circumstances.

It results, therefore, in the production of an *individual*—system of parts so co-ordinated in their forms and activities as to constitute an *indivisible* though complex whole—a whole which cannot be divided without destruction. Thus a stone can be split into many stones, but a plant or animal cannot be so divided without ceasing to exist as such.

Increase by development, therefore, is opposed to increase by *accretion* from without, or chance conglomeration of materials, as in the case of the rolling snowball; and to *mechanical construction* like that of a watch, ship or building. In these, the materials are dragged or driven together by forces

Development consists in rising from a less to a more perfect state by self-differentiation and self-co-ordination;

Thus acquiring greater power of self-preservation by self-adjustment to changing circumstances;

And is opposed to accretion and construction from without,

operating on them from without; so that the thing is put together by forces foreign to itself, and has no constructing and unifying energy within itself.

Where then is such development found in nature?

A rudimentary phase of development is seen in nebular and planetary systems;

1. It is claimed that the material cosmos is a product of development, or at least that part of it with which we are best acquainted, our own solar system. The materials of the system must have existed at one time, it is believed, in the form of a nebula, or homogeneous cloud of gas or dust in a state of intense agitation, like the nebulae still seen on the outskirts of the cosmos; and sun, planets, and satellites must have been formed by differentiation and conglomeration of particles, by the working forces and laws inherent in the original material itself; and must hold on another together in a moving equilibrium by a self-adjustment of these inherent forces, so as to form a unity in plurality. But there is no real division of labour nor reciprocity of functions in the planetary system. Thus cosmic development stops short at a rudimentary stage.

A higher phase is seen in crystallization,

2. Development of a certain kind is seen also in the chemical processes by which the ultimate elements of matter integrate themselves into atoms and molecules and complex substances. This can be studied best in the formation of crystals. Thus when water containing any salt is gradually evaporated, certain molecules begin to draw together, and form themselves into crystals. One molecule here and there takes control of others, and draws them towards itself, and makes them deposit themselves round about itself in symmetrical layers one outside another, until a double pyramid is built up of minute blocks of salt.

The pyramids of Egypt were built of blocks of stone quarried, hewn, brought to the place, and piled up in layers one outside another by forces external to themselves. *viz.*, the builders. But the blocks of salt are drawn together, and fixed in their places by forces inherent in themselves, acting in subjection to the force inherent in the central block. And that a certain self-preserving unity and individuality has been attained even in the crystal, is shown by the fact that, when a corner is broken off, the crystal heals this injury to itself by drawing new molecules, and rebuilding the lost part. Still there is no real distinction of parts nor division of functions among the mass of molecules which make up a crystal, so that here also the development is only of a rudimentary kind. Yet the accumulation of molecules of C, H, O, N, to form the living organic cell has often been

compared to this accumulation of molecules by purely physical forces to form the crystal.

3. But development in its highest form is met with first in organic life, and rises from the sphere of life into that of mind. And its meaning may be illustrated by comparing the increase of a living organism, such as a *tree*, with that of a mechanical structure such as a *Building*.

In the case of the building, there is some one that forms the idea or plan in his mind; and there are the energies of the many labourers, who select and bring together the materials, shape them, and raise them into their places, according to the design of the master. Thus everything is done by forces from without. The house has no plan, no unity, and no energy within itself; it cannot build itself nor repair itself as even the crystal does, when a portion of it is removed; it is only a passive product of forces external to itself, and not a product of development from within.

But the tree begins as a microscopic germ from another tree; and in that germ there are already contained both *the plan of the whole*, and *the energy which carries out the plan by operation from within*. It begins by appropriating the heat of the sun, and transforming it into forces by which it draws external materials of air, earth and water into itself; selects what is suitable for its own growth, and rejects the rest; and projects the selected materials into their proper places according to a plan inherent in itself; and thus evolves from within all the organs that are necessary to its own continued life and growth; and gives unity and order to them all, and makes them all work together as one unitary thing. And when some of its branches are pruned away, the tree repairs the loss by developing other branches. Thus the relation of the organs and the common life of the whole is reciprocal. The common life evolves the organs, and the organs by their co-operation maintain the life of the whole, and thereby themselves.

§ 46.

Development applied to mind.

But the question which we are mainly concerned with here, is that of *mental development*. Does the principle of

But development is seen at its highest in the sphere of organic life,

As contrasted with mechanical construction;

For organisms are self-differentiating and self-adjusting,

Building themselves up by power working from within.

Now the same principle holds

true of mind
also;

For mind
also is self-
differenti-
ating and self-
adjusting
unity in
plurality;

And grows
by differen-
tiation and
integration
of powers
and capa-
cities from
within,

Rising from
vague feel-
ing of plea-
sure and pain
and auto-
matic self-
preservation,

Through dis-
crimination
of sensations
and move-
ments impos-
ed by
external
circum-
stances direc-
tly present,

development hold good of mind as it does of organic life? If it does, in what does mental development consist?

(1) That the principle of development does apply to mind, would appear to follow from the fact that *mind is itself a kind of organism*. For in mind, in its mature state, we find a complicate system of ideas and feelings, powers and capacities, which support one another reciprocally, and are all connected together, and made to work together as functions of a single self so as to constitute and maintain the *unity in plurality* which we call mind.

Thus mind would seem to be an organism in much the same sense as the body is; for the plurality of ideas and powers are pervaded, and held together, and made to work together for a single end by the self which realises itself in and through them, in much the same sense as the organs and processes of the body are evolved and pervaded by the life of the whole.

(2) The conclusion is confirmed by observation of the growth of individual minds. But in considering this, we must here pass over the question, whether mind originates by continuous development from the life of the organism—a question of metaphysic and philosophy. We must begin with the lowest form of consciousness; and consider whether the *transition from the lowest to the highest forms is of the nature of a development*. Now experience shows that in mind there is a gradual differentiation and co-ordination of capacities and faculties from within, corresponding to that of organs and functions in an organism.

(i) For it can be seen that in its lower forms, as in the shell-fish, or worm, and even in the human infant, consciousness amounts to nothing more than a vague discrimination of *pleasurable* and *painful*; and where there is so little *intellection*, *feeling* itself will be very faint; and *condition* will be only of the reflex and automatic kind.

(ii) But from this the intellective power rises to discrimination of the more general organic, tactuo-muscular and visual sensations, corresponding to changes going on within the organism itself, and those going on in the physical surroundings in contact with the organism, such as hunger and satiety, heat and cold, light and dark, motion and resistance. And as pleasurable and painful feelings become more

explicit, the creature's powers of movement become more varied; and, from being spontaneous and casual as at first, they come to be co-ordinated more and more with pleasurable and painful sensations, and adapted to promoting the one kind and preventing the other, and thereby preserving the life of the creature against those forces of the environment that are directly acting upon it.

(iii) But as the sensations of the different senses—taste, smell, sound, vision—become more explicit, so do the different sensations of the same sense—different tastes, smells, sounds, colours. And as sense-impressions become more distinct and intense, so the effects or traces which they leave of themselves in the system become more distinct and permanent; and thereby *memory* of the past and *anticipation* of the future begin to assert themselves; and *conation* rises, from being effort of self-preservation under *present* circumstances merely, into being effort of self adaptation or preparation to meet *future* needs and dangers; but at first in a general and automatic way.

To power of ideation, or of representing past, distant and future things in idea, which is memory and imagination,

(iv) And in proportion as the power increases of differentiating sensations and of integrating and preserving them as ideas of memory and imagination, the fundamental function of *understanding* becomes more and more explicit, or power of interpreting sensations as implying things in space and time, and of *reasoning* from present to past, distant and future thing. And from the power of thinking and reasoning about things, there spring the higher feelings called *emotions*, rising out of ideas, and beliefs concerning the past and future.

And of understanding the meanings of sensations and ideas, and the uses of actions, and of distinguishing what is good and bad,

(v) And from the powers of intelligent thought and emotion together springs the power of *purposive conation*, i. e. of foreseeing the future, and forming an idea of one's highest good, and of intentionally selecting and regulating one's activities in such a way as to prepare for the future, and thereby preserve and perfect one's self, and realise one's highest good—which is *rational will*, the highest phase of mind.

And finally, to power of adjusting all the activities of the system for the attainment of what is felt to be the highest good—which is rational mind.

Thus mind gradually becomes a complicate system of powers—intellectual, emotional, and volitional—with their products, e.g., ideas, beliefs, emotions, habits; and as these factor differentiate out of one common source, so they continue to

But this differentiation of faculties and powers is evidently a case

of development.

We must admit therefore that mind also is an organism,

And develops.

And the development of individual mind is correlative with that of collective mind, as that of organ with that of organism.

But the question of mental development is really of much wider range than contemplated above, and includes—

The question of the origin and growth of mind in the animal world,

depend on, and influence one another reciprocally; so that none would be possible without all the rest, and every change in one of them changes all the rest; and the one mental power which evolves them, also permeates and controls them, and makes them all subservient to its own end of self-preservation and perfection. Now this is what we mean by organization and development.

It is evident, therefore, that the individual mind is *an organism as much as the body is, and undergoes similar development by differentiation and integration of parts and functions*, realising and keeping up the same unity in plurality—a unity of mind, corresponding to the unity of organic life—a consciously self-adjusting individual—a *person*.

And indeed the principle of organization and development must be carried beyond the individual mind, and applied to *collective* or *objective* mind, i. e., to communities or societies. For society also can be shown to be an organism, differentiating and integrating its branches and functions in much the same way as the individual body and mind do; but with this difference, that the mental life of society never attains to the same individual unity in plurality which characterizes the mental life of the individual.

Now as emotion and volition depend on intellect, it is evident that the main line of development is the intellectual; and the fundamental question of mental development is whether power of understanding, and thereby of voluntary action, originate by continuous development out of such rudimentary mind as is found in animals (human mind out of animal mind), or has an independent beginning of its own, peculiar to man:—

Stages of mental development:

But there are, in reality, three stages of development that fall within the range of mental science in its widest sense.

(1) Mental development in the *animal* world, from the first beginnings of mind in the lowest animal forms, upwards to man. In the lowest forms, even in the microscopic amoeba and bell-uniciliate, the beginnings of mind are discernible. Their movements to escape from danger and discomfort, and attain food and security cannot be explained by physical and chemical processes alone, but manifests same power of anticipating and preparing for the future, which is mind. And when, in higher species, organisms become more complete, and life begins to be centralised in, and regulated by a nervous system as in worms, molluscs and insects, mental manifestations also become more complete. And this is still more so when the nervous system (consisting at first of ganglia distributed through the different segments of the body as in worms and insects) comes to be

centralised more completely in a single brain, as in birds and mammals, and finally in a cerebrum as in man.

But the question of a real continuity of mental development in the animal world is bound up with the further question whether animal organisms have originated by continuous development from lower to higher forms as argued by Darwin, and belongs therefore to biology and philosophy. The question, whether human mind could have originated by continuous development from animal mind as Darwin maintained or supposes an absolutely new and distinct beginning as most think, is a question of metaphysics and philosophy.

(2) The development of mind in the *human race* from its earliest condition down to the present. Apart from the question of origin, many now believe that at a very remote period mankind, even the races which are now the most civilized, were in a condition, intellectual, moral and social, inferior to that of the lowest stages at the present day; and that they have risen to their present condition by a process of continuous development. In their struggle for self-preservation men have acquired new capacities of feeling, and new powers of thinking and acting, which by repetition came to be confirmed as habits; and were thus gradually registered in the structure of the brain and mental system, and thereby handed down by inheritance, and thus went on accumulating from generation to generation through immemorial ages. Hence men are born with all those mental powers and capacities latent in their nature, which were acquired by ancestors during the past history of the race. But the development of individual mind is brought about by reciprocal intercourse and co-operation of many minds in society. Therefore it is never planned and promoted by the development of objective instruments—civil customs, laws of government, religion and industry. Hence the study of development in this sense belongs more especially to the mental science called sociology.

(iii) The development of the *individual mind* from infancy to maturity. It is with this that psychology is most directly concerned, because it is only by understanding mind as it now is—as it manifests itself to every individual in his own self-consciousness, and to others in its external actions and productions—that any understanding can be attained of the collective working of mind in societies, and of its lower phases in the animal world. Psychology is especially interested, therefore, in tracing the development of the intellectual powers, and aesthetic and moral sentiments, in the individual mind, and the conditions on which it depends. We have therefore to consider the general conditions on which mental development depends in every individual mind.

Together with the relation of animal and human mind;

And the question regarding the growth of mind in the human race collectively in the past,

By gradual acquisition and inheritance,

As well as the narrower question of the growth of the individual mind from infancy to maturity, which is psychology in its narrower sense.

§ 47.

Conditions of mental development.

But it is possible to state in a general way beforehand the conditions which determine the growth of the individual mind, such as—

The internal conditions will include whatever must be inherent in the nature of the mental principle before it can be mind;

The capacities, powers and tendencies which the individual mind inherits from ancestors;

To discover the innermost laws and conditions of mental development is among the highest results aimed at by mental science; but it is easy to state, even at the outset, the general conditions and forces which must combine as factor in producing development in the individual mind, and to attain some idea of how these different forces co-operate in determining what the mind of child will ultimately become. These will fall under two heads, *internal* and *external*.

1. The *internal* and *subjective* conditions will include :

(a) The *existence* of the mental principle itself, with the *latent powers and capacities which are essential to mind as mind and make it to be mental*, or capable of developing into actual mind. For development or evolution in the proper sense of the word, is only an *unfolding* of what is already potential, a making explicit of what is already implicit. A particle of sand cannot grow into an oak tree—only a germ can in which the form of the tree, and the power of realising it, are already present. Hence the impossibility of conceiving a development of mind out of matter, because the more we discover about matter, the farther removed do we find it to be from anything mental. Hence it is necessary to suppose, at the very beginning of development, a principle which is already at least *potentially* mental, and which is capable of developing itself into perfect mind.

(b) And to this fundamental attribute of being *potentially mental* from birth we must add also, as another internal factor, those *powers and capacities which the individual mind inherits* from parents and ancestors—powers which the essential mental principle has acquired by experience and practice, and which in the course of many generations of individual minds have become engrained in the nature of mind by habit, and have been transmitted by inheritance, and have gone on accumulating from generation to generation down to the present. Thus it is generally believed that we inherit, in the form of instincts and tendencies, the powers and habits which our ancestors acquired by the experiences of many generations

II. The *external* conditions will include :

(a) The *physical organism* and *nervous system* in and through which the mental principle realises and manifests itself as mind. As mental and physical powers and processes correspond with, and run parallel to each other, and affect each other reciprocally in their development and working, so they would seem to correspond in inheritance also. Hence our inheriting the powers and tendencies of mind, which our ancestors acquired by experience and habit in the course of many generations, depends on our inheriting the cerebral and bodily structure which they acquired along with them ; and the development of these powers and tendencies in ourselves is dependent on the reproduction and healthy working of this bodily structure in ourselves.

And the external conditions will include the organic structure which also is inherited from ancestors

But the development and healthy working of organic structure is dependent on physical forces acting from without (as well as on life and mind operating within) ; and the external physical conditions which influence the development and hereditary transmission of organism, will influence that of mind also. Hence mental development will depend partly also on—

(b) The *physical environment* in the midst of which the organism and mind develop, and which will include the climate, soil, and products of the country, and the character, and abundance or scarcity, of the means of sustenance.

The influences of country, climate, and physical conditions called the physical environment,

These physical conditions will influence the mind in two ways—(1) they will promote or hinder directly the development of the organism, and thereby indirectly that of mind ; and (2) they will call forth and exercise all the latent and potential powers of the mind, *intellectual* and *conative*, in order to preserve itself against the forces of nature, and turn them into instruments for its own benefit. Thus the mental characteristics of Kaffres, Arabs, Greeks, Esquimaux, depend not a little on the different physical influences to which these peoples have been exposed for many ages. But finally, mental development will depend very largely also on.

(c) The *social environment*, or minds and mental products to whose influence a particular mind is subjected from birth. This factor will include (1) the teaching and examples of parents, relatives, teachers and companions, with their characters and accomplishments, ideas, manners, and habits ; (2) the influences of the customs and institutions, enlightenment or ignorance, civilization or barbarism of society in which the child is brought

And also the influences of other minds—culture, and social environment.

up; (3) and those of the laws of the state and the common ideas, beliefs, and feelings embodied in language, literature, and religion. For every mind receives most of its ideas and beliefs from, and has its feelings and activities excited or repressed by, other minds, either directly through word and example, or (in civilized society) indirectly through the permanent products of mind in literature, art, law and social institutions.

Hence the question, what any particular mind will develop into, will depend on the co-operation of the above five sets of forces ; and the character of mature minds will depend on, and vary with these factors ; so that if one knew the nature and degree of each of these forces, and the laws of their operation, he could deduce from them what a particular child would ultimately become in respect of mental development.

Which of these factors, then, does most to determine what a particular mind will become ?

(1) It has been sometimes assumed that all minds are essentially the same at birth, and that it is mainly the social conditions to which they are exposed, that determine their character. Men are born neither good nor bad, but ready to be *made* either the one or the other. "Human nature" is nothing but "the first formed habitudes." Minds are like seeds of the same species of plant, which are all essentially the same in kind, but may be sown in different soils, exposed to different degrees of light, temperature and moisture and produce flowers very different in appearance. Even so, mental differences are due to the different circumstances in which minds are placed, and the different kinds of training which they receive. Intellectual and moral education is therefore the principal factor in the making of a man.

(2) Others think that men are made to be what they are mainly by the tendencies and dispositions which they inherit from their ancestors, and which are innate in them from birth. External influences physical or social can do nothing more than develop these instinctive tendencies, or check them for a time, or guide them into particular channels of activity. But in spite of these, every man continues to be essentially what nature has made him. The function of education in the making of a man is therefore very restricted —it can do but little to change the force of hereditary impulses. These are the extreme opinions on the subject.

Psychology then, because it is a science, must aim at discovering the laws of the development and working of the mental powers and processes. Hence it is desirable to determine here the precise meaning of *law* and *laws* of mind.

But opinion
has varied as
to which of
these factors
is the most
important.

Some think
that it is
mainly the
social en-
vironment
that make a
man to be
what he is.

Others think
that heredity
is the chief
factor in the
making of a
man.

IX

LAWS OF MIND.

§ 48.

Science aims at a knowledge of general truths, *i.e.*, of truths which are not merely true of particular things *here and there and now and then*, but true universally of all things of the same kind. A collection of particular statements about particular things may supply data or premises for scientific inductions, but is not itself science. Thus a dictionary, or a work on geography or history, if it is only a collection of particular facts, is not considered a scientific work, however minute and accurate it may be (unless it be in the sense that it supplies materials from which scientific conclusions may be drawn). But when the philologist, from the facts contained in dictionaries, tries to discover the general laws (such as Grimm's law) according to which words and idioms change, and new languages differentiate; and when the geologist, from known facts concerning the composition and form of the earth's crust seeks to infer the causes at work in its formation; and when the historian seeks to derive from his data the general laws which govern the prosperity, and decay, rise and fall of nations—then their inquiries rise into science.

The reason for this is, no doubt, that a particular truth may express what is merely superficial and accidental—arising out of a casual and temporary combination of circumstances. A general truth, on the contrary, rises out of something that is *general or common* to a whole class of things, and is for that reason *fundamental and essential* to the nature of the things. Hence, saying that science aims at general truths is equivalent to saying that the knowledge at which it aims is *knowledge of what belongs to the essential nature of things*, and for that reason manifests itself universally; as opposed to what is merely superficial and contingent, and therefore occurs only occasionally. This is what is meant by saying that science aims at discovering the *Laws of things*.

Science aims at the discovery of general truths concerning things;

Because what is generally true of things must have its root in their inner nature

And general truths concerning things are their laws.

ence
psychology
aims at
discovering
the laws of
mind..

So, in the case of mind, an enumeration of the mental characteristics of individuals, however minute and accurate, is not science of mind. Psychology becomes science only when it begins to determine general truths which are *true*, of *all minds alike*, are not merely of a single mind here and there; and which for that reason may be understood as *expressing what is true of the essential nature of mind as mind universally*. This is equivalent to saying that it aims at discovering *Laws of mind*.

The historian may penetrate into, and describe profoundly the mental characteristics of individuals such as Elizabeth or Napoleon, and the novelist or dramatist may make his individual personages express their own inner natures very fully and accurately in their speech and actions; but this, though sometimes called psychology, is not the science of psychology.

§ 49.

Original
meaning of
law—way in
which people
act in con-
formity with
the will and
command of a
superior.

The term *Law* (1) in its original sense had a political meaning and had reference to *conduct*, i.e., to voluntary actions of persons; and meant a *general proposition expressing a general form or standard or conduct*, imposed upon persons from without (whether by heaven, or by the state, or by the established custom of society); and to which all persons are required to make their actions conform; and which are conformed to, not *necessarily* indeed, but at the risk of penalties in the case of neglect. Thus the ten commandments, the laws of the twelve tables, the laws of Manu, the edicts of Asoka, the laws of inheritance, are laws of conduct in this sense.

Meaning of
law in science
—the way in
which things
of a class uni-
formly be-
have in con-
sequence of
something in
their essen-
tial nature.

(2) But from this it has been extended in science to mean a *general proposition expressing the way in which all the things of a class must necessarily behave in conformity with something (known or unknown) in their own essential nature* and common to all members of the class. It therefore expresses a form of action which arises necessarily out of the essential nature common to a whole class of things; and is therefore true of things; of that class universally under the same circumstances, and can for that reason be expressed as a general proposition.

Thus, while law in its literal political sense, is a body of general propositions expressing forms of action prescribed to

persons by external authority, according to which they may *voluntarily* regulate their actions, but which they *may* set aside if they will ; a law in the *scientific sense* of the word, is a general proposition expressing a form of action to which things *necessarily* conform, in consequence of something fundamental and essential in their nature.

Thus such propositions as—"every particle of matter draws every other particle towards itself with a force proportional to the square of its distance"—"every planet moves in an elliptical orbit"—"its radius traverses equal areas in equal times"—"all iron is liable to be decomposed by oxygen"—"all mammals are air breathing animals"—"the same cause always produces the same effects,"—are scientific laws of nature. They are propositions expressing the way in which things are known to behave universally and necessarily when brought into certain relations to other things.

Examples of physical laws.

Nevertheless it may not be known what it is in the nature of a particular class of things, that makes them behave so. Hence the *law* according to which an event takes place (*i. e.*, a thing always behaves) is not to be confounded with the *reason* nor with the *cause* of the event. The cause is the force (the "something in the nature of the things,") which produces the event, or makes the thing always behave so and so, and the law is a statement of the way in which consequently it always does behave. A statement of law merely answers the questions : *How* do things of such and such a class always behave under given circumstances ? A statement of cause answers the question : *Why* do they always behave in this way, or what makes them behave so ? Thus the law of gravitation expresses the way in which every particle of matter in the universe behaves in relation to every other, but it does not explain what it is that makes them behave so. Newton himself, though he demonstrated the law, could not give the cause, of gravitation. The reason, again, is the use or purpose for which they are made to behave so and so.

But law must be distinguished from cause—the how from the why ?

§ 50.

Mental Laws.

Now if we apply the idea of law to mind, we find that there are four kinds of mental laws.

Four kinds of mental laws.

(a) There are what may be called *psychological* laws arising apparently from the essential nature of mind, so that mental processes *necessarily* conform to them because they

Psychological laws are scientific in the above.

sense—springing out of the nature of mind, and necessary to all minds,

are mental. Such laws may be defined as *general propositions expressing what is true of mind, (or more precisely, of particular classes of mental processes and products), not in particular cases merely, but universally under the same circumstances ; and for that reason expressing what is fundamental and essential to the nature of mind.* Thus such propositions as the following will be laws of mind—

Being the ways in which mind must operate in order to be mind.

“Every state of consciousness involves discrimination”—“every mental process has an organic process corresponding to it”—“to make a sensation increase in arithmetical progression, the stimulus must increase in geometrical”—“every perception supposes a sensation”—“language is necessary to abstract thought”—“all emotions suppose ideation”—“all voluntary actions rise out of desire”—“all volitions are determined by motives”—“all influences tending to increase the vitality of the system are pleasurable”—“things occurring together in experience become associated in idea”—“similar and opposites tend to suggest each other”—“pleasure is a mean between two extremes.”

Such propositions as these express general truths, which are general, not by chance, but because they spring out of something in the essential nature of mind, and are therefore *laws of mind.* To discover such general laws is the object of psychology as a science.

Logical and moral laws are not necessary to the existence of mind, but are necessary to its attainment of its highest ends.

(b) But there are also *logical* laws of mind. These apply to the intellectual processes by which mind seeks to attain true ideas about things which do not come within the range of actual perception, *i.e.*, to processes of reasoning. And they may be defined as *forms to which the reasoning processes must conform if they are to attain the end at which they aim; viz., true knowledge of things.* They are laws, however, which are not necessarily, nor always conformed to. We often violate them in reasoning, and arrive at results which are not true. We may syllogize without making sure that all our middle terms are distributed, or that our major premiss is true.

(c) And there are also *moral* laws of mind. These apply to voluntary actions ; but they are not laws to which actions necessarily conform, but to which they must conform if they are to be good in themselves, and consistent with the highest perfection of the agent.

(d) The above kinds of law have their ground in the nature of minds and things independent of the will of men. But there are also *political* and *social* laws which are created by men themselves, and are conformed to not necessarily, but from a sense of their utility, or from fear of punishment; and it is from these (as explained above) that the word *law* is derived (literally, what is *laid down* and prescribed).

Political laws are more or less conventional, according to convenience and utility.

Thus psychological laws correspond to physical laws in this, that they can neither be changed nor violated. Logical and moral laws can be violated but not changed, and political and social laws can be both changed and violated. Psychology proper, then, has to deal with the first of these four classes of mental laws. The others belonging to the derived mental sciences, Logic, Ethics, Sociology and Jurisprudence.

PART IV. MENTAL ACQUISITION.

X.

COGNITION : PRELIMINARY ANALYSIS AND SUMMARY.

§ 51.

Definition.

Psychology of cognition is inquiry into the processes by which we know things;

By psychology of cognition or intellection is meant the investigation of those mental processes by which we acquire our *knowledge* of the things, and qualities and relations of things, both mental and material, which make up the world ; or, in other words, of the processes by which mind constructs within itself, and in terms of its own consciousness, a system of ideas corresponding in order and connection to the world of things independent of its consciousness, and becomes aware of their correspondence.

But generally restricts itself to knowledge in the empirical sense—experience-possible in terms of experience.

It means, therefore, the psychology of the intellectual powers ; but, being scientific in the narrower sense, it limits itself to the experiential aspect and meaning of knowledge. For epistemology or theory of knowledge, we have found, may be both experiential and metaphysical. As experiential, it consists in analysing the ideas and beliefs which we have formed in the course of our experience, and seeking to understand *how* they have been formed—the *phenomenology* of cognition. As metaphysical, it endeavours to determine how far the ideas which we thus form in terms of experience (*phenomena*) can possibly agree with realities as they are in themselves behind the phenomena in which they manifest themselves, and how these essential realities are related to one another so as to produce phenomena and build up the world,—the *ontology* or metaphysic of cognition. Thus, what the contents of our common ideas of matter and the material world are, and by what processes these ideas are formed, are questions of experiential psychology ; but how far these ideas agree with things as they really exist independently of our experience, is one of metaphysic.

We are concerned here only with the experiential side of the inquiry—the intellectual processes by which our ideas and beliefs are formed—and with regard to this we have, in any preliminary analysis of intellect, to take into account first the *general* antecedent condition which is necessary for the acquisition of knowledge; then the *essential factors* which enter into all the processes of knowledge; and then the different stages in the application of the knowing powers, called the *intellectual faculties* (already indicated).

It includes therefore the following branches of study.—

§ 52.

Condition.

1. The principal antecedent condition of attaining knowledge (apart from the possession of the intellectual powers themselves) is the power and exercise of *attention* or self-concentration, which consists in applying effort of will to the intellectual activities, to control, direct, and concentrate them upon particular objects of observation and thought—things and ideas—in order to discriminate them and their relations more clearly, to understand them better, and fix them more deeply in memory. For thinking is an activity, and as such it is an application of conation or will power.

I.
The study
of the mind's
power of re-
gulating its
own intellec-
tual activi-
ties,

Which must
however be
referred to
volition.

Without such power of self-concentration upon things, the impressions made by things would be superficial, transient and useless for purposes of knowledge. Hence many writers on psychology deal with attention here at the beginning of intellect. Attention, however, is an application of volition, and falls for fuller consideration under that head.

§ 53.

Factors.

II. Again, there are certain factors which enter into all the intellectual processes, and appear in all the different forms and stages of intellectual work, and which we have already found to be reducible to the three heads of discrimination, conservation and understanding, but which require further analysis and illustration. Thus—

II.
Of the essen-
tial factors
of all intellec-
tual work
which are

(a) All intellect involves *discrimination*.—We have found that consciousness is subject to the law of relativity, which supposes differences of state, and a continual comparison

(a) Discri-
mination of
impressions

between things and distinguishing of differences. A continuous homogeneous state could not enter into consciousness at all. Hence the intellectual activity involves a continual effort to penetrate into, and *differentiate* whatever comes before it, because it is only by discriminating differences that it can remain conscious. And the discovering of differences, we have found, is always accompanied by *assimilation* in the sense of discerning similarities (which is the basis again of assimilation as an *amalgamating* and *integrating* force). And thereby of mental acquisition and memory.

(b) **And conservation of impressions,**

(b) All intellection involves *conservation* of impressions leading to memory and imagination; for while elementary consciousness supposes discrimination of sensations, feelings and activities, knowledge requires that their effects be retained within the system so as to be capable of being revived again in whole or part in the form of ideas, as materials for thought and knowledge. And conservation is brought about in this way, that all impressions and activities leave traces of themselves behind, which become integrated with one another, and with the mental system as a whole, thus becoming incorporated into, and preserved as constituents of the mental life, and subservient to its purposes, and therefore capable of being raised into consciousness again when required. And this integration of impressions with one another, and with the collective contents of mind, takes place in two ways—

Through cohesion of materials by association,

By association, colligation, or cohesion, the effect of which is that things and qualities of things, which have been experienced together in nature, become connected together in the mind into one complex idea or system of ideas, so that we never think of one without thinking of all the rest, e.g., the form, touch, colour, taste, smell and name of the fruit which we become conscious of through different sensations at different times, become associated together into one concrete idea of the fruit—(and it is by this process that ideas are connected together in such a way as to be retained and revived in memory and recombined in imagination); and—

And fusion of materials by assimilation.

By assimilation, amalgamation or fusion, the effect of which is that many different ideas, when they happen to contain essential attributes in common, become amalgamated together in thought into one *general idea*, in which superficial differences

are eliminated, and what is fundamental and essential is retained—(which is the process of generalisation or conception, which makes thought possible by reducing the unthinkable multiplicity of particular ideas to a thinkable number of *general ideas or concepts*).

Thus assimilation and association may be spoken of as the integrative and conservative functions of intellect. And of these, the *associating* activity is the function specially concerned in the construction of ideas of particular things from the materials of sensation, and in the reproduction of such ideas in memory—things being remembered through the *associations* or *connections* which have been formed in the mind between the ideas of them. And *assimilation* is concerned chiefly in elaborating and transforming ideas of particular things into, and reviving them under the form of general ideas; by means of which cognitions are classified and organized, and reasoning made possible from the past and present to the future.

The conservation of impressions and ideas in the mind has some analogy, it may be observed, to the conservation of forces in nature. We know that a physical force which has once operated is never lost, but, though latent in potential form for a time, may re-appear actively at another time. So a cognition once amalgamated with the mental system is, we may safely say, never lost, but, even when not revived as a distinct idea, helps sub-consciously to determine the character of the mind as a whole.

(c) Finally, all knowledge involves *understanding*. Intellect or cognition itself is something more than a mere discriminating and adding together of sensations. To the sensationist maxim: "there is nothing in intellect which was not previously in sensation," Leibnitz added the qualification, "except the intellect itself." By this he meant that it is not enough for purposes of knowledge, that mind should have sensations impressed upon it, and retain and remember them; it must also have the power of *understanding and interpreting their meaning*; and this power must be seated in the nature of the thinking principle itself, and brought into the world along with it. Animals have sensations, and often finer discrimination of sensations than man; and yet they have little that can be called knowledge. And understanding implies at least this much—that in having feelings and sensations, we understand these as functions and manifestations of something which we think of as substance or reality—thereby arriving at a concep-

By these
processes
mind forms
concrete
ideas of
things,

And rises
from these to
general
ideas,

Whence
conservation
of mental
energy;

(c) And
under-
standing,

Or power of
interpreting
the meaning
of sensations
and thereby,
arriving at
knowledge of
things.

tion of a world of *things*, as distinguished from the sensations and feelings themselves.

But the questions involved in *understanding* or *reason* require a deeper study of "the theory of knowledge" than is attempted in ordinary psychology; for the question of knowledge reaches so deep that it comes to be practically identical with the problem of metaphysic itself: What must we be in order that we may know the world, and what must the world be in order that it may be known by us?

§ 54.

Intellectual 'Faculties.'

III.
And it in-
cludes the
study of in-
tellectual
faculties,

(A)
Of acquisi-
tion,

By means
of sensation,
and

Perception,

III. In rising from elementary feeling to knowledge, the mental activity rises through certain stages of intellectual work, which, though really contemporaneous, and contained as factors in one complex process, may be treated as if they followed each other successively, according to their order of logical dependence. These are spoken of as the *intellectual faculties*, and include—

A. *Acquisition*, or the processes by which we become aware of the existence of things and of the qualities and relations of things, as immediately *presented* to us in experience, and thus obtain materials of thought and data of knowledge. Now this presentation of things to the mind supposes first—

(i) *Primary feeling, affection, or sensation*, which is the self's consciousness of the changes of state which are imposed upon it by the influences of the surrounding world, and by its own activities of reaction by which it preserves itself against the forces of the world. It is only through being thus *affected* that it can attain to consciousness; and it is only through such conscious *affections* or *sensations* that it becomes aware of the existence of itself as the subject of them, and of other things as the causes of them. But sensation is only the means or material of knowledge; and out of it rises

(ii) *Perception*, or the activity by which the thinking principle *interprets* and *understands* its sensations, and thereby comes to know through them (as phenomena) the existence and attributes of the realities which manifest themselves in them; and which therefore includes—

Internal perception, or *self*-consciousness, in which the self cognizes, in the midst of its own changing state, the reality of itself as the permanent subject which experiences them ; and

External perception, or *other*-consciousness in which the self comes to *understand* these affections of itself called sensations as being imposed upon itself from without and to *interpret* them as the manifestations of a world of things extended in space, and therefore external to itself, and thus arrives at the idea of, and belief in the material world.

It is to be observed that, though sensation comes properly under the department of feeling in the sense of affection or passive consciousness, yet the dependence of intellect upon sensation as the material of knowledge, makes it necessary to study sensation in connection with intellect.

So that sensation, may be called the material of knowledge.

B. *Conservation* and *Re-presentation*, or the processes by which the past perceptions of the self are retained, and afterwards reproduced in the form of mental re-presentations, images, or ideas, and thereby connected into one continuous mental life ; and which takes the forms of

(B)
Of conserva-
tion and re-
production,
including

Re-production or *Memory* in which past experiences are reproduced in the same form in which they were originally experienced ; and

Memory and
Imagination.

Re-construction or *Imagination*, in which materials preserved by memory are taken asunder and re-combined again into ideas of things different from any that we have actually experienced.

Imagination.

It is to be observed that memory and construction are sometimes both included under the common name of *imagination*, *i. e.*, thinking in concrete mental *images* : though in common language the word *imagination* is limited to re-construction. And finally thought rises into

C. *Elaboration* or *Logical Thought*, the processes by which we apply the truths already obtained by perception and preserved and reproduced by memory, as means by which we reach out to other truths not given by perception, *viz.*, to truth concerning past, distant, and future things ; and thereby arrive at last at some understanding of the world as a whole. This stage, therefore, includes *reasoning*, and the processes subservient to it, *viz.*, *judgment* and *conception* or *classification*.

(C)
And of the
process and
products of
reasoning.

The analysis of the above processes as they actually go on in the mind comes under *psychology*. The art of using or applying them in such a way as to arrive at true ideas of things belongs to *logic*. And the question whether and in what sense ideas,

Hence
Psychology,
Logic, and
Metaphysic.

which correspond truly to our experiences, can be held to correspond to things as they really are in themselves independently of our sensations and ideas, is the question of *metaphysic*.

The first subject to be considered, therefore, under Cognition, is the sensations or primary affections which supply the means and materials from which the thinking self constructs its knowledge of the world.

XI.

PRIMARY FEELING; SENSATION.

§ 55.

Psychology has therefore to deal first with the Acquisition of knowledge, and under Acquisition the first thing to be considered is sensation which supplies the materials from which knowledge is obtained. And under sensation the first thing is its

Definition.

The mental principle, being itself a finite reality, exists by interaction with other finite things, and therefore knows other things in so far as it comes into relations of interaction with them, and is *affected* by them. It knows them, therefore, in and through its *affections*. And the various ways in which it is affected by the surrounding world enter into consciousness as those states which we call *sensations*—as cold and hot, light and heavy, hard and soft, light and dark, taste and smell, etc. The sensations, therefore, are feelings, in the sense of being passive states or affections. They may be called primary feelings to distinguish them from *emotions*, because they precede and give rise to thought, whereas emotions follow in consequence of thought; and also because they are the most primitive states of consciousness. For we speak of even the lowest animals as *sentient* creatures; and they are such because they live in constant interaction with their surroundings, and are affected by them. Now though sensations are truly affections or passive states, they enter into the psychology of *cognition* because they are the means by which we *cognise* things, and are the materials, so to speak, out of which knowledge is constructed—the terms in which we build up material images of things. And as mind is affected by other things through the medium of the organism, the study of these primary affections will involve the study of the organs and organic processes through which they are brought about, i. e., of the structure and working of the sense-organs and muscles.

Mind knows other things in so far as it is affected by them,

And the capacity of being affected by things is sensibility,

And the consciousness of being affected by anything outside of self is sensation ;

Now, to define sensation, we may (a) assume a knowledge of the relation which psychology has discovered to exist between sensation and organism, and say that sensations are *those states of consciousness which are found to be occasioned directly by corresponding states and processes of the organism and indirectly by states and processes of extra-organic things affecting the mind through the medium of the organism.* (b) But as we know what sensations are, without knowing anything about their dependence on organism, it is more logical perhaps to avoid assuming such knowledge, and to define them as *those states of consciousness which carry with them the conviction that they are occasioned and imposed on the conscious self by something outside the self*, or, in other words, *by something which is not self, nor any previous state or activity of self.* They are states, therefore, in which the self feels itself to be comparatively *passive*, i. e., to be *acted on* and *affected*; and which it is therefore compelled to think of as having their ground or occasion in something other than itself.

Which is therefore conscious passivity, as opposed to the activity of conation.

For the widest distinction that comes within the sphere of consciousness is the difference between *acting* and *being acted on*, *activity* and *passivity*. Hence at one extreme of the field of consciousness we have *sensations*, in which we feel ourselves to be *acted on* by other things and to be ourselves comparatively *passive*; and at the other extreme, we have *conation* or *volition* in which we feel ourselves *reacting* upon other things, and therefore *active*. •

Thus, when we experience cold, taste, smell, sound, colour, pressure, fatigue, physical pain, we know that the feeling is not due (directly at least) to any effort of ours, nor to any previous state of our minds, but is forced upon us by something not ourselves. As states of consciousness they are in our self but, in having them, we feel that they have their ground of existence outside of our self. States thus *impressed* upon us are *sensations*.

But even sensation supposes mental reaction in some degree,

Thus there are two forces at work in the production of sensation—external influences forcing impressions on the mental principle, and internal reaction of the thinking principle on these impressions for its own self-preservation (as mind cannot be wholly passive even in sensation). By this reaction the mental principle transforms the external impressions into

material of consciousness, *viz.*, sensation, and thereby becomes aware of its own relation to external things.

For it must be borne in mind that there is no such thing as *pure passivity*, or *activity*, nor therefore pure sensation or volition, *i. e.*, states of consciousness in which we are conscious of being acted on without reacting, or of reacting without being acted on. Action and reaction must always be present together in some degree, and must enter into consciousness together; but at one time passivity predominates, giving sensation, and at another, activity constituting volition.

The first of the above definitions defines sensation by reference to organism and external world, and therefore from the stand-point of the objective method. And the objective definition given above may be made more elaborate by borrowing details from physiology, and saying that sensations are *those states of consciousness which are directly occasioned by, and correspond to physical processes in the brain-centres, which again are caused by physical forces acting on the outer extremities of in-carrying nerves, and thereby sending currents of nerve-force inwards to the brain, and causing changes there.*

Sensation has also been defined as "*the consciousness of certain affections of our body as an animated organism.*" But it is not directly a consciousness of affections of body, but of mind. We come to *understand* to be sure, in course of time, that the mental affection has its *ground* in a corresponding state of body; but we must distinguish between the bodily state (some unknown process of nerves and brain) and the mental state resulting from it, which is the sensation itself.

But such definitions of sensation by reference to organism, may be objected to logically as involving the vicious circle; because we have elsewhere to turn round and define organism and external world by means of sensations (through which alone we know them). The second definition avoids this objection by defining it wholly from the standpoint of self-consciousness, without assuming any knowledge of organism.

Hence, the marks which distinguish sensations from other modes of consciousness are mainly these: (1) that they are *passive states* or *affections* (in which they agree with the emotions). (2) That the initiative in the production of them comes from *outside* the mind (and not from *within*, as in the case of the emotional states); the mental principle must indeed co-operate in the production of them (for the same physical forces do not produce sensation in an inanimate object, where there is no mind to receive them), but its part is only that of *compulsory, involuntary reaction*; whence we feel the sensation to be imposed and forced upon

Transforming external influences into consciousness.

Different definitions have been given of sensation,

Viz. with or without reference to the bodily organism.

But sensations are clearly distinguished by certain marks from other mental states,

Such as their passivity,

And independence of will.

us from without. And (3) that, while the mind carries its ideas and emotions about with it everywhere (as its own property, so to speak), its *sensations* depend wholly upon the presence of external things, and therefore upon external circumstances over which it may have no control, and must therefore be thought of as dependent on an external world—(so much so that in some cases we fall into the habit of thinking of our sensations, not as states of our minds which they really are, but as states or qualities of external things, as, *e.g.*, we think of colour as a quality of the flower, and heat as seated in the sun).

And are the materials through which we know things,

And the *function and importance of sensations in the economy of mind* consist in this, that they both reveal to us the existence of a world of reality outside of us; and supply us with materials for constructing *within* our minds a conception of the world *without*, *viz.*, that *mental representation* of an *extra-mental* world which we call knowledge.

And in terms of which we represent things in our thought.

For, being states and processes of self occasioned by states and processes of not-self, they reveal, by their own existence, the existence of a not-self; and by their modes, qualities and degrees, they reveal the modes, qualities and degrees of the not-self, *i.e.*, of the external things which occasion them. For the qualities in general of things are powers of causing effects in other things (their manifestations or phenomena); and their qualities in relation to us are their powers of occasioning sensations in us, and are therefore manifested to us in our sensations. Thus the fire melts the ice (objectively), and occasions in us (subjectively) the sensations of heat and light, by which we know it and its properties. *Knowing things, therefore, is equivalent to interpreting and understanding the sensations which they occasion in us.*

§ 56.

Constituents.

But sensation includes the consciousness of two kinds of effect—*viz.*,

Of the impression made directly

But sensation is not an altogether simple mental state. We can distinguish two elements in a sensation. It includes not only effects directly produced in the system from the outside, but also effects of these effects. Things produce an *impression*, or comparatively *direct effect on the mind*, (through some special organ); and it is this directly produced effect of the external thing that corresponds most directly to the quality and degree of the thing, *e.g.*, its colour, sound or smell. But this impression, directly

produced by the thing, produces at the same time further effects of its own upon the organic and mental system as a whole. These secondary and diffused effects are beneficial or otherwise, and, entering into consciousness along with the sensation proper, give a *tone* to the sensation, by *making it to be felt as agreeable or disagreeable, pleasurable or painful*, e. g., as a *pleasant colour*, a *sweet smell*. Hence these two elements must be distinguished as contained in every sensation—

through
special sense-
organs and
nerves;

(a) A primary and *presentative* or *intellectual* element, *viz.*, that element of the sensation which corresponds most directly to the form, quality, composition and position of the extra-mental thing occasioning it; and which may be said, therefore, to *present* the quality of thing to the mind in terms of consciousness e.g., its colour, taste or smell. The presentative element of one sensation is clearly distinguishable from that of another because occasioned by a different quality. This distinctness may be explained by supposing that the presentative element is, in so far, an affection of a *particular part* only of the system, as colour, of the retina; sound, of the ear; and for that reason clearly distinguishable from affections of other parts. It is therefore these presentative elements of sensation that constitute the materials out of which the self, by its intellectual power, constructs its knowledge of the existence and qualities of external things. And—

And of the
diffused effect
produced by
this impres-
sion on the
whole sys-
tem, making
itself felt as
agreeable or
disagreeable
feeling.

Hence the
sensation
includes
presentative
elements
giving
knowledge of
things.

(b) A secondary element, *viz.*, the *diffused* effect of the impression, consisting in the *aesthetic tone*, or feeling of pleasure or pain accompanying it; which probably arises from the way in which the impression from without effects the whole system collectively for better or for worse, and which we cannot therefore think of as corresponding to anything in the external thing which occasions the sensation. Thus a bitter taste or discordant sound is felt as unpleasant, but we do not think of the unpleasantness as seated in the thing, but only in our own consciousness.

And aesthetic
elements giv-
ing pleasur-
able or pain-
ful tone to
the sensation;

And these two elements—the *local* impression and the *general* effect produced by it—stand to each other in something like an *inverse ratio*. For the more the system as a whole is agitated pleasurable, or painfully, the more diffused and indefinite is the affection, and the less the knowledge derived

In inverse
ratio to each
other;

from it. The sensation of tickling, especially, shows how a sensation may begin with a simple local impression—in this case, touch—but may become diffused at once through the whole system, so that the original presentative element, *viz.*, the touch, is lost in the general agitation.

The one having objective import and reference, and the other being purely subjective.

Hence it is only the former and more definite elements of the sensation that serve as materials for our representation of the world. The accompanying pleasure or pain we cannot possibly think of as representing anything in extra-mental things. It is purely *subjective* without corresponding to anything *objective*; and by itself gives no element of knowledge. It is not a *presentation*, or mental equivalent of anything extra-mental, but only feeling; and may be spoken of as the *aesthetic quality or tone* of the sensation in which it is contained.

Thus, when I come upon a flower, there are present to my mind (1) the *definite impressions* of colour, touch, form and smell, which I know to correspond to attributes inherent in the flower independent of my self, and which enable me to know that it is a flower, and one of the kind called rose or lily; and (2) the diffused *feeling of enjoyment*, which the colour, form and smell together excite in me, and which I know to be only a state of my own organism and self, not representing anything in the flower.

§ 57.

As sources of knowledge.

Hence in psychology of cognition we have to deal only with the knowledge-giving elements of sensation.

Thus knowledge is derived from the distinct physical impressions which things make on special organs, and the distinct mental impressions to which these organic impressions give rise. It follows that the different qualities and degrees of sensations will reveal and represent to us the different qualities and quantities of things. We have, therefore, to analyse and classify these knowledge-giving elements of sensation, which reveal the existence, and represent to minds the qualities and differences of external things (omitting for the present all consideration of the aesthetic tone of sensations).

These correspond to properties of things, and therefore to powers seated in them;

Now, as finite things exist by action and reaction with other things, the qualities of things are essentially *powers* by which they affect other things; and, through the organism, affect the mind in different ways and degrees, thereby giving rise to corresponding states of consciousness which

present (or represent) the things and their qualities to the thinking self. Thus a thing forces upon us sensations of weight, hardness, colour, taste and smell, and we think of these as qualities of the thing. And every impression or sensation thus produced will force itself into consciousness, and impose itself upon the attention, with a certain *intensity* or *degree* of force ; will be of a certain *kind*, or have a certain *quality* of its own, differentiating it from other kinds of consciousness ; will have a certain *duration* in time ; and will occupy a certain *extent* (so as to speak) of the field of consciousness ; and, in so far as it corresponds directly to an affection of a particular part of the organism,—of the eye, hand, ear or tongue,—it will be capable of being referred to, and *localised* in that part. And these distinguishing characters of the sensation will correspond to distinguishing characters of the thing, and will reveal and *represent* them to mind.

Now these *representative* or *knowledge-giving* characters of sensation may be classed under two heads, *quality* and *quantity* ; of which the most fundamental is *quality*, because *quantity* is only the amount or degree in which some *quality* is present. Thus there will be

I. *Differences of quality*: Sensations differ in *quality* or *kind*, because they correspond to external forces, and these differ not only in *degree* but also in *kind*. Thus there is an essential difference of kind between the luminiferous ether and the atmosphere, and therefore between their vibrations also, the one kind giving light and other, sound ; and between the impact of solids on the surface of the body and the chemical actions of liquids and gases on the tongue and the nasal membranes, and so on. And the organs adapted to receive and transmit these different forces (the eye, ear, skin, tongue, nostrils) also differ. Hence, the sensations to which they give rise will differ in the *kind*, as well as in the *degree*—in the *quality* as well as in the *quantity*—of the consciousness which they contain. Thus, taste is a different *kind* of consciousness from sound, and sound from colour ; and we believe that these differences of sensation correspond to, and represent to our minds, differences in the things which occasion the sensations. And of these qualitative differences of sensation—

A
h
a
a
t
t
p
l

Hence the knowledge-giving elements of sensation will be those which represent to us the qualitative and quantitative, temporal and spatial, attributes of things.

Sensations present to us the qualitative differences of thing,

Or differences of kind.

Both generic qualities,

(1) Some will be *generic* and fundamental, corresponding to different external forces, and different organs for receiving them, *viz.*, the sensations of the *different* senses colour, sound, taste, smell and touch-colour sensations being produced, by vibrations of lumeniferous ether, sound by waves of atmosphere, taste by chemical action of different substances on the gustatory bulbs, and so on; while

And specific qualities.

(2) Others will be *specific* only, corresponding not to different forces, but only to different *modes* of the same force and organ; *i.e.*, to the same force and the same faculty of sense operating in different ways, and giving *different sensations of the same sense*. Thus different colours are produced by the same external force, *viz.*, ethereal vibrations operating through the same organs, *viz.*, the eye, but in different ways, *viz.*, in waves of different degrees of rapidity and in different combinations; and the same is true of different sounds, tastes, etc.

Do the nerves themselves then differ specifically?

Thus the simple and natural explanation of the generic and specific differences of sensations seems to be that they are occasioned by corresponding differences of the stimulating forces. It assumes that differences of nerve-processes correspond directly to differences of stimuli. But against this, many have held the theory of the 'specific energies' of the sense-nerves—that the nerves are so differentiated that each nerve has its own specific mode of operation, producing its own specific sensation whatever the external stimulus may be; and in support of this some experimental evidence can be produced. Thus the optic nerve may be affected by other stimuli besides ethereal vibrations, *e.g.*, by a blow on the head, on electrical current, certain chemical agencies, etc., but whatever the stimulus, the sensation is always the same *viz.*, light. Similarly, different stimuli applied to nerves of taste, smell, etc., produce only sensations of taste and smell. From this it would seem to follow that the differences of sensation are due more to directly specific differences of the nerves than to external stimuli.

Or do the different kinds of sensation depend on differences of external forces?

This theory has been applied to support a subjectively-idealistic theory of knowledge, *viz.*, that sensations and differences of sensation are due to sub-conscious influences working from within the mind itself, and not to anything extra-mental. But the experimental facts on which the theory is based can be explained otherwise than by any specific energy of the nerves.

§ 58.

II
Sensations present to

II. *Differences of quantity*: Again, sensations differ in *quantity*, because qualities of things differ from one another

in *intensity*, *extension* over surface, and *duration* in time, and these are modes of quantity. Quantity will therefore have the three forms of *intensity*, *extensity*, and *duration*, or, as they have been named, *intensive*, *extensive*, and *protensive* quantity. And we believe that these quantitative differences of sensation correspond to, and represent differences in the things which occasion the sensations. Thus—

us also the quantitative differences of things :

1. Sensations differ in *intensity* or *degree*. Sounds are loud or faint; lights become bright or dim; we feel the difference between sunlight and moonlight, a flash of lightning and the spark of a fire-fly, the report of a canon and the rustling of a leaf; tastes and smells vary from being barely distinguishable to being overpoweringly strong: and we know that this *subjective* difference of the mental affection corresponds to an *objective* difference of the extra-mental force, and therefore of the thing from which the force proceeds—some difference of power, magnitude, or distance.

1. Thus sensations present differences of intensity, in the external forces acting on the mind;

The first and most important attempt to apply *measurement of degree* to mental processes (psychophysics) was in the case of sensations. How can it be done?

And this led to the first application of psychophysical experiment, viz.

Though differences of degree are obvious enough to introspective observation, yet they are not susceptible of precise measurement by introspection alone. We cannot determine precisely in this way how much sweeter one liquid is than another, or whether a star is of the second or third magnitude. This is accomplished, however, by combining an objective standard with introspective observation. Thus we can apply finely graduated series of external stimuli to an organ of sense, and observe their effects upon the degree of sensation produced, noting what increase of the stimulus is needed to produce the least distinguishable increase of the sensation, thus subjecting the latter to an objective scale of measurement.

To measure the intensity of sensations, determining—

Thus different degrees of pressure or weight may be applied to the hand, different infusions of a soluble substance to the tongue, different degrees of atmospheric vibration to the ear, and so on; and the way may be observed in which these different degrees of stimulation affect the resulting sensations of pressure, weight, taste and sound. And in this way the easily measurable external stimulus may be made to serve as a scale to measure the subjective sensation.

The chief results arrived at by experiment of this kind have been the determining of the *lowest* and *highest* limits of sensibility, and the *ratio* between the increase of sensation and that of stimulus.

(1) The lowest limit or threshold of sensibility,

(1) As to the *lowest limit* of sensation: it is found that the external stimulating force applied to the organ must rise to a certain degree or quantity before it gives to any sensation. This point at which stimulus passes over (so to speak) into consciousness, is called the *threshold* of the sensation or *liminal intensity* of the stimulus, *i.e.*, the degree of stimulating force needed to pass over into the sphere of consciousness, and produce the lowest degree of sensation (the *absolute sensibility* of the mind to this kind of stimulus being greater or less, according as the force needed to produce sensation is less or greater).

As in pressure and weight;

Thus, when the hand is laid on the table and successive objects laid upon it, the objects must reach a certain degree of weight before they give rise to any sensation of pressure. When the hand is held out in the air, the objects must reach a certain amount before they give rise to any feeling of weight. Atmospheric waves must strike against the drum of the ear with a certain force before they give rise to any sensation of hearing, and so on.

The liminal intensity will, of course, differ greatly in different persons, and even in the same person at different times. And when the organ is a surface, as in the case of sight and touch, different parts of it are found to differ in sensitiveness. In certain abnormal states of mind certain senses may attain to an extraordinary acuteness of sensibility. This state is called *hyperesthesia*.

(2) The comparative rate of increase—stimuli must increase in geometrical progression to make the sensations increase in arithmetical.

(2) As to the *comparative rate* of increase of sensation and stimulus: when the stimulus is increased, the sensation is found to increase also, but not in the same ratio as the stimulus. In order to produce equal perceptible increments of sensation, *i.e.*, to increase it by the *audition* always of a fixed quantity (or in an *arithmetical progression*), the stimulating force must be *multiplied* always by a fixed quantity (*i.e.*, it must increase in a *geometrical progression*). This has been called the law of Weber. From this law it appears that the stimulus suffers obstruction somewhere on its way to mind, so that the sensation increases more slowly than the stimu-

lating force ; and also that sensation increases not continuously like the stimulus, but by successive steps, each successive step having a definite proportion to the sum already attained. (Fechner expressed the same law by saying that the sensation increases and diminishes not as the stimulus but as the logarithm of the stimulus).

Hence sen-sation in-creases not continuously, but by suc-cessive steps,

The constant multiplier, however, is only one *plus* a fraction. Whence another way of stating the law is, that the stimulus must be increased always by the same fraction of itself, (that fraction being called the quotient of sensibility). It differs for different persons, and is the index of what may be called the discriminative *sensibility* of the sense, *i. e.*, its greater or less power of discriminating differences of degree, which differs in different persons.

Thus, suppose that the lowest perceptible degree of a sensation is n , and the amount of force needed to produce it (its threshold or liminal intensity) is 9, and the increase of stimulus needed to produce an increase of sensation be $\frac{1}{3}$ (or in other words, that the multiplier be $\frac{4}{3}$ or $1\frac{1}{3}$, as in the case of pressure) ; then, in order to produce an increase of feeling in the ratio, $n+1$, $n+2$, $n+3$, etc., the stimulus will have to be increased in the ratio, 9, 12, 16, $21\frac{1}{3}$, etc.; *i. e.*, the stimulus will have to be increased always by one-third of itself, in order to produce a perceptible increase of sensation.

As if by one constant fractional multiplier,

The experiment is most easily made in the case of sensations of pressure and weight. When the hand is laid on a table, and weights placed upon it (giving the sensation of pressure), then the weights have to be increased always by $\frac{1}{3}$ of themselves to produce the least perceptible increase of the sensation. When weights are laid on the extended and unsupported hand (giving the feeling of weight), differences of $\frac{1}{6}$ are distinguishable. In the case of sound, we cannot distinguish an increase of less than $\frac{1}{3}$ in the stimulating force, but in the case of light we can discriminate an increase so small as $\frac{1}{500}$.

And does not represent directly the degree of the stimulus, but stands in constant ratio to it,

Hence the sensation does not *directly* increase with the quantity of the stimulating force, but falls behind ; and increases more slowly as the stimulus increases more rapidly. Where then, in the transition from the external stimulating physical activity to the resulting mental state, does the obstruction and retardation in the increase take place ? (i) Is it in the brain, and owing to the excitations having to be diffused over a wider area, and thereby weakened ? Apparently not, for the excitation seems rather to be multiplied and increased in passage through the ganglia. (Yet some think

Making it to be a question of interest where the obstruction

takes place,
and what
causes it.

that the law holds good of physiological processes themselves—that they all increase in a uniform ratio, but more slowly than their physical stimuli). (ii) Or is it in the transition from brain to mind, from physical to mental? In other words, is there something in the nature of mind which makes increase of degree proceed more slowly in consciousness than in the physical world? This was Fechner's opinion. (iii) Or is it within the sphere of mind itself, and due to *relativity of judgment* merely, the intensity of feeling already attained making it always more and more difficult to distinguish a further increase? In this case the retardation would be only apparent, not objectively real. Thus is Wundt's opinion. The question has not yet been conclusively answered.

(3) An upper limit of intensity is reached at last beyond which sensation increases no further.

(3) As to the *upper limit* of sensation: notwithstanding the importance attached to Weber's law, this law is found not to be strictly true except of the middle parts of the scale of degrees. As at the lower end of the scale (near to the threshold) the increase of sensation is more rapid than might be expected from the law, so at the upper end the increase of sensation becomes slower than is consistent with the law, until at last a point is reached beyond which increase of stimulation produces no further increase of sensation. In other words, there are degrees of pain, sound, light, beyond which no further increase in the intensity of consciousness is possible.

This point has been called the *height of the sensibility* of a sense; and the interval between the *threshold* at which feeling begins and the *height* beyond which there is no increase, is the range of its sensibility. It may be observed, however, that increasing the stimulus often changes the quality of a sensation, more than it increases its intensity. The change from shadow to sunlight is a change of quality as much as of intensity; that from a bass to a treble tone, is felt as a change of quality alone.

2. Sensations are found to reveal also the extensiveness of external things.

2. Sensations differ also in what has been called *extensity*, *massiveness*, and *volume*; and this difference also may be considered a form of quantity, because it is found to correspond to the volume and space-extension of the external cause. These terms are figurative, indeed, but they serve to express a difference which is obvious to consciousness. Some sensations have the appearance of filling the whole field or area (so to speak) of their senses (apart from the question of their

intensity), and therefore being *extensive* or *voluminous*, whether intense at the same time, or not; while others have the appearance of being limited to a sharp point, and therefore of being only *acute*, *i.e.*, intense without being extensive. Thus the diffused moonlight is *extensive*, though not intense; while the glare of an electric lamp is *acute*; the sound of the sea is *voluminous* and that of thunder with its many echoes is *voluminous* as well as intense, while the screech of a parrot is *acute*; the pressure of the water on the body of a swimmer is *extensive*, while the prick of a needle is *acute*; and so on.

The feeling of greater or less extensiveness, seems therefore to be due to stimuli received simultaneously from many different points in space, affecting simultaneously certain surfaces of the organism which contain many distinct nerve-endings. Thus, suppose a portion of the skin or retina containing 1000 nerve-endings, be affected simultaneously by stimuli of the same kind and degree, what will the result be? Will the sensations of the different nerves be felt singly as so many different sensations? No. Will they be all fused together into one compound sensation of greater intensity? No. They are felt simultaneously indeed, but the effect is neither that of one more intense sensation, nor that of a multitude of distinct sensations, but a sensation carrying with it a peculiar feeling which may be called a feeling of extensivity (because it is found to be due to the excitation of a surface of some extent *i. e.*, of a multitude of co-existent points). It is characteristic, therefore of those sensations whose organs are surfaces, *viz.*, touch and sight; and is accompanied from the beginning by the power of *discriminating acute impressions*, (*i. e.*, intense without being extensive) whenever they occur, *on different points of the surface*, *viz.*, of the skin or retina.

Though the meaning of this characteristic can be understood only through subsequent interpretation.

For we learn to understand it as implying the extension of the external causes;

This feeling, again, of the difference between extensivity and acuteness of sensation comes ultimately to be connected with the idea of *locality*, because a power is gradually acquired (by experience) of referring such acute impressions to the point affected, *i. e.*, localising them, and understanding their relative positions on the surface of the organ (discriminative *local sensibility*). Some have thought that the idea of space and extension of things in space is originally derived from this feeling of the extensivity of certain sensations in the body. But the truth is, that it is in itself only a form of sensation, and has no *spatial* significance to the mind until the understanding of space has been otherwise acquired, after which this quality of

Through which it comes to be connected also with the understanding of locality or position.

sensation can be interpreted as *implying* extension in the things which cause it.

And makes possible the local discriminativeness of the surfaces,

And the local *indiscriminativeness* of a surface organ (e. g. skin or retina) is measured by the distance at which two acute impressions (two points of pressure, or of light or colour) can be discriminated from each other, and felt as two (instead of running together in sensation into one.) The smaller the distance, the greater is the discriminative sensibility of the organ to locality, and the greater, therefore, its aptitude for *presenting* to the mind the *positions* and relations of things in space.

And the local character of their sensations.

The local discriminativeness of both the skin and the retina, however, differs in different parts of their surfaces, and depends probably on the degree in which the different parts are supplied with nerve-endings. It appears, therefore, that the local differences of sensation are due to differences of the nerves supplying different spots. Within the area supplied by one nerve-branch there is no distinguishable difference of quality; areas supplied by different branches give sensations of slightly different qualities. In the case of touch, these areas, as measured by compasses, are very small on the most sensitive parts, as tongue, lips, fingers; but much larger on other parts, as the back. Differences of quality of kind among units of sensation, arising out of the locality stimulated, are called their *local signs* and *local characters*, because they point to the part of the body affected.

3. Sensations reveal also the duration of external events,

3. Finally, sensations differ also in *duration* in time, and this also is another form of quantity. But sensations have duration in two senses. They have (i) that kind of duration which depends on the greater or less prolongation of the external exciting cause; a sense-experience may last for a fraction of a second, or for an hour; and duration in this sense is representative of the external stimulus, and therefore knowledge-giving. But they have also (ii) a kind of duration which depends not on the external cause but on the organic process out of which the sensation directly rises, *viz.*, its property of *lingering in consciousness* for a shorter or longer time after the external cause has ceased to operate. Thus, an impression of light or colour may be nearly momentary, the sensation ceasing almost along with the objective cause. But in most cases even of light and colour, and always when the light or colour is *intense*, the sensation lingers for some time after the extra-organic cause has been withdrawn, as the sensation of light after looking at the sun,

Though they have duration in two senses one of which is subjective merely.

This is also the case with sound to some extent, and still more with taste and smell, which linger in consciousness and fade away gradually. This kind of duration, then, gives no knowledge of outward things.

The above differences, therefore, of *quality*, *intensity*, *extensity* (with *locality*) and *duration*, may be taken as a classification of the main presentative constituents of sensation —those which give us our knowledge of the attributes of the external world, by representing in terms of consciousness the quantities and qualities of external things ; as distinguished from those vague and diffused effects which depend more on our own organism than on external things, as, *e. g.*, pleasure and pain.

Thus sensations reveal not only the existence but also the attributes of external things.

XII.

THE SENSES AND THEIR ORGANS.

§ 59.

Sensations are those states of mind that are occasioned by influences affecting mind directly from without,

And may be classified according to the different kinds of influence affecting it externally.

Hence, sensations occasioned by vital processes affecting mind from within the organism;

Sensations occasioned by forces affecting mind from outside the organism;

Mind communicates with the rest of the world through the medium of its organism. Sensations are those forms of consciousness in which mind is affected by the influence of things other than itself, through the working of the different organs of the organism. Such foreign influences may proceed either from causes lying inside the organism (*i. e.*, in the organs themselves), or from causes lying outside, in the extra-organic world. We may classify sensations, therefore, according to the classes of organs by or through which mind is affected. Of these there are three :—

(a) The organs which *carry on the work of life*, *viz.*, those by which the organizing principle assimilates nutritive material from the outside, and evolves from that material the energy which it applies to the work of preserving and perfecting itself in its struggle with the forces of external nature. These are the organs of digestion, circulation and secretion—the heart with the arterial and venous systems, the lungs, liver and other viscera, together with the muscles which carry on the work of the organs and change the position of the organism in relation to external things, and the bones which support the muscles and organs. The working and changing states of these organs in health and disease give rise to what are called the *sensations of organic life*,—those in which the self is consciously affected by causes lying within its own organism.

(b) The organs through the medium of which the mental principle is affected by causes *lying outside* its own organism—by motions of solid bodies, by liquids and vapours, atmosphere, and ethereal medium—obtaining thereby the sensations of touch, taste, smell, temperature, sound, light and colour, from which, by exercise of understanding, it rises to knowledge of the external world, and thereby realises itself as rational mind. These then are the organs of the *special senses*, the skin, eye, ear, tongue and nostrils.

(c) The organs by means of which the mental principle, guided by the knowledge derived from the special senses, applies the energy evolved through use of the vital organs to *react upon* and *produce changes in the external world*, and thereby preserve itself by adapting external things to its own purposes. These are the limbs with their muscles, tendons and joints, the operations of which, in movement and resistance, give rise to the peculiar class of feelings called *muscle sensations*.

And sensations in which it is affected by the working of the limbs in obedience to its own will and which are therefore mixed with active consciousness.

The muscle-sensations might indeed be classed with organic sensations, if it were not that in muscular work, passive sensation is mixed up with consciousness of an entirely different kind, *viz.*, the active consciousness of *putting forth effort* to move the limbs and overcome resistance ; in other words, with the consciousness of conation. The mixture of passive with active consciousness—that of being acted on with that of acting—separates the consciousness of muscular work from organic sensations, and gives it a peculiar place and importance in the economy of mind, as a source of knowledge.

Thus the working of these three classes of organs gives rise to three classes of sensations—*organic*, *special*, and *muscular*. Hence—

A.

The Sensations of Organic Life.

§ 60.

The organic sensations are those occasioned by causes lying inside the organism, and affecting the outer extremities of those incarrying nerves which take their rise (without any special end-organs) in the muscle-fibres and vital cells of the viscera, in the walls of the blood-vessels and digestive organs, and under the surface of the skin. These afferent nerves transmit the changing states of the organs to the brain-centres, and the resulting states of brain give rise to the sensations called organic, because their causes lie inside the organs. Now these general *organic nerves* are affected—

A.
Sensations
arising from
changing
states of the
organs them-
selves, which
carry on
the work of
life—

I. By *wounds* and *sores* of particular parts, producing *ingoing currents*, and giving rise to painful sensations, which can be localised with more or less precision, in the parts affected. These are the sensations of cuts, burns, bruises, boils, and other sores, which are the source of great part of the acute pains of life.

From
wounds and
sores ;

From the working of the vital organs in health and disease—

From their healthy working,

And from their disordered working.

And from the condition of the organism as a whole, giving common feeling.

Hence the characteristics of organic sensation—

Vague, and important for feeling, but not for knowledge,

II. By the working of particular organs, producing agreeable or disagreeable sensations only vaguely localisable in the organs which give rise to them, and including—

(1) Feelings arising from their *normal* and *healthy working*, as that of the heart, lungs, stomach, liver, in circulation, nutrition and secretion. In continuous health, indeed, these feelings tend to combine in the general feeling of well-being. A healthy man, it is said, does not know that he has a stomach or liver. It is chiefly after illness, and by contrast, that the healthy action of the organs gives distinct feelings. Under this head those feelings also might be included which arise from the alternate contractions and relaxations of the muscle-fibres and the friction of the joints in movement and physical work, as reported by incarrying nerves. These, however, are always mixed up with the consciousness of active effort, and have therefore to be considered separately under the head of muscle-consciousness.

(2) And the feelings arising from their *disordered working*, as that of the stomach and liver in digestive disorders, affecting the ends of incarrying nerves contained in the organs, and producing painful feelings, only vaguely localisable in the organs which give rise to them.

III. And by the physical condition of the organism as a *whole*, affecting the nerve-endings *collectively*, and producing agreeable or disagreeable feelings not capable of being localised in any particular part. These are the *general* or *common feelings*, and include—

(1) *Hunger* and *thirst*, which seem to be general in the main, though to some extent referrible to the stomach, or the blood-vessels ; and

(2) Feelings of *weakness*, *fatigue*, *weariness* and *collapse* and feelings of *drowsiness* and *repose* ; and their opposites, the feelings of *health*, *freshness*, *vigour* and general *well-being*. These seem to pervade the whole physical system, and cannot be localised in any particular organ.

The organic feelings, therefore, will have these *characteristics* :—(1) Their nerves are not collected into special end-organs adapted to receive special kinds of influence, but are scattered through the tissues. Hence (2) the sensations

themselves are vague, and are not clearly marked off from, but shade into one another, and therefore are often difficult to distinguish from one another. And (3) for the same reason, they are mostly difficult to localise; the pain of an external sore can be localised definitely, but that of an internal disorder, only vaguely, and common feeling not at all. And from these peculiarities it follows (4) that in them the representative element is at its minimum. The more distinctly *local* ones reveal, indeed, the presence of hurts and disorders of particular organs; and the *common* ones are an index of the rise and fall of vitality in the system as a whole; and together they constitute *a large part of the happiness and greater part of the miseries of life*; but their importance is for feeling, rather than for knowledge.

And not
distinctly
localisable.

B.

The Special Sensations.

§ 61.

The *special sensations*, again, are those states of consciousness, which are occasioned by extra-organic forces, acting on the outside of the organism, and affecting *end-organs adapted to receive special external forces, and transmit them by currents of nerve-force along special lines of nerve, to special centres in the brain*, so that the resulting sensations correspond to, and represent in terms of consciousness, special states of external things.

B
Special sensations arising from the ways in which mind is affected by forces of nature acting on organism from without,

Thus, the *eye*, with its focussing lens and its layer of retinal cells, is an organ specially adapted to receive the waves of the luminiferous ether, and to transmit corresponding waves of nervous vibration to the brain, giving rise to the special sensations of light and colour.

The *ear*, with its vibratory drum, and its winding shell lined with nerve-cells and fibres, is specially adapted to receive undulations of the atmosphere, and report them by corresponding neural waves to the brain, giving rise to the sensations of sound.

Through different sense organs corresponding to different external forces.

The *skin* is provided on its under-surface with a network of nerves ending in minute corpuscles which are compressed by pressure from without, and, propagating the force inwards by tactual nerves, give rise to the sensations of touch.

The *nostrils* are lined with a layer of special cells which are affected by vapours and gases contained in the air inhaled, and, by transferring their effects to the brain centres give rise to the sensations of smell.

The *tongue* is provided with a layer of specially adapted cells which seem to be acted on chemically by soluble substances taken into the mouth, and thereby give rise to the sensations of taste.

Distinguish-
ed by their
being distinct
and localis-
able,

And there-
fore know-
ledge giving.

Is there one
fundamental
sense of
which the
others are
modifica-
tions?

Tactual and
chemical
senses.

Hence the special sensations will be distinguished from the organic ones (1) by their having specially adapted terminal organs to receive and transmit special extra-organic forces ; (2) by the multiplicity of the degrees and qualities of their sensations, corresponding to different kinds of external force ; (3) by the distinctness with which they can be discriminated from one another, and assigned to different sources and localities in the organism, and through that, in the external world ; and hence (4) by their *presentative* character, or aptness for presenting, in terms of consciousness, the qualities, positions, and relations of extra-mental things, thereby becoming materials of knowledge.

What then, we may ask, is the nature of the changes which are produced in the sense-organs by those external forces, and which give rise to sensations ? This is equivalent to asking what fundamental kinds of interaction there are between the organism and the world. Now it appears, at first thought that the one fundamental and universal kind of interaction is by mechanical contact of surfaces. Every living thing presents a surface to the world, and is in contact with solids, liquids and atmosphere. Hence some have thought that *touch* or *pressure* must be the fundamental sense, and that all the others must be modifications of it. But the truth is that every organism is as liable to chemical change as to mechanical impact. It is composed mainly of protoplasm, which is a very complex substance, and therefore very liable to alternation and decomposition by external forces such as heat, and light, and chemical force. Hence there must be sensations arising from chemical change as well as from mechanical impact. The senses in which the impression is produced by mechanical impact are *touch* itself, and *hearing*. *Taste* is certainly chemical; *vision* almost certainly so; and *smell* probably so.

The next thing, therefore, is to consider the several generically different *special senses*, with their organs and modes of operation and the different varieties of sensation to

which they give rise. They are commonly reckoned to be *five* in number. Hence we consider first that special sense which seems to be least removed from the organic, *viz.*, taste.

§ 62.

I. *Taste* has its peripheral seat in the middle and posterior parts of the upper surface of the tongue, scattered over which are a number of prominences, some flat-topped and some conical, called *papillæ*. Inside the larger papillæ are small flask-shaped cavities, each filled up by a cluster of slender nucleated protoplasmic cells, 20 or 30 in number, laid over one another like the rudimentary leaves in the *buds* and *bulbs* of plants. Hence these bundles of cells contained in the flask-shaped cavities of the papillæ are called *gustatory buds* or *bulbs*. They give out nerve-fibres which run together, and form the *gustatory nerve*, and are therefore the real organs of taste.

The nature of the process, however, is obscure; but it certainly involves a chemical reaction between the liquid or soluble substances taken into the mouth, and a liquid secreted by the blood-capillaries with which the papillæ are abundantly supplied, or some substance contained in the cells themselves. The chemical process, whatever be its nature, affects the protoplasm of the cells, giving rise to an *ingoing current* to the brain, and the resulting brain-process causes, or is at least accompanied by, the sensation of taste.

Taste, therefore, has been spoken of as pre-eminently the "chemical sense"; and seems to be placed at the entrance of the digestive canal to test the composition of the substances admitted into the alimentary system.

The *especially* different varieties of tastes, however, are few in number, and generally mixed up with other sensations of *generically* different kinds, producing mixed sensations. Hence we have to distinguish between—

1. The *pure* sensations of taste, of which there probably are not more than four that can be clearly discriminated from one another, *viz.*, sweet, bitter, salt, and sour—if even these are not really reducible to two, *viz.*, sweet and bitter; and—

2. The *mixed* sensations, in which taste is mixed up with generically different feelings, and which include—

Taste.

Its organ.

Papillæ.

Bulbs.

Chemical process.

Taste sensations.

Pure.

Mixed,

With organic sensations,

(i) Some in which taste proper is mixed up with *organic* feelings of the digestive system; because, being placed at the entrance of the canal, the taste-nerves work simultaneously with those of the throat and stomach in swallowing and digesting food; and hence the two kinds of sensation, being both vague by nature, become in many cases mixed up together in consciousness. Thus the feelings of *relish* and *disgust*, excited by some articles of food, are combinations of taste and organic feeling.

With tactful sensation,

(ii) Some in which taste is mixed up with *tactual sensations*; for, besides being the seat of the gustatory bulbs, the tongue is, of all parts of the bodily surface, the most richly supplied with tactful nerves. Hence taste is always accompanied by tactful sensations, and in some cases becomes mixed up with them indistinguishably, in one compound sensation. This is the case especially in what are called *acrid* and *pungent* tastes.

With smell.

(iii) And some also in which taste is combined with *smell*, for, being excited often simultaneously, and by properties of the same substance, and having their organs in proximity to each other, these sensations also will have a tendency to become fused together in many cases. Thus, what is called the *flavour* of foods and drinks is a combination of both taste and smell.

It follows from the vagueness of its sensations, and their tendency to intermixture, that taste will contribute but few presentative or cognitive elements, and therefore will rank but low as a knowledge-giving sense.

§ 63.

Smell.

II. *Smell* has its seat in a membrane lining part of the nasal cavity (the *olfactory region*), which is composed mainly of a layer of nucleated cylindrical cell laid horizontally, their outer ends being exposed to the currents of air entering the nostrils, and their inner ends giving out nerve-fibres, which combine to form the *olfactory nerve*.

Its organ.

Olfactory cells.

These cells are affected in different ways by the different vapours and gases contained in the air which is drawn in to supply the lungs; and the changes thus produced in the cells give rise to ingoing currents, and thereby to the brain-processes which give rise to the sensation of smell. Thus, the sense is seated at the entrance to the respiratory organs as if to test the quality of the air admitted. But the nature of the process by which gases affect the olfactory cells—whether it is a process

of chemical reaction upon the contents of their outer surfaces, or a mechanical irritation of the cells—is not altogether certain.

Process,
chemical or
mechanical

The sensations of smell are numerous, but are so indefinite, shade into each other so gradually, and are so liable to intermixture with one another and with other sensations, that accurate discrimination and classification is impossible, and language has been able to find no very accurate system of nomenclature for smells. Thus they are specially liable to intermixture—

Sensations of
smell.

(i) With *tactual* sensation of the nostrils ; for some vapours, such as ammonia, affect not only the olfactory, but the tactual nerve-endings also ;

Mixed with
tactual sense-
tion,

(ii) With organic sensations of the *respiratory* system ; for some vapours and gases have the effect of stimulating respiration, and others that of depressing and checking it, as impure atmosphere does, so that their smell becomes mixed up in consciousness with the organic sensations of the lungs to which they give rise ; and

With res-
piratory or-
ganic sensa-
tion,

(iii) With *common* or *general* organic feeling, as when vapours have the property of soothing or exhilarating the system as a whole, or of exercising a depressing or soporific effect, *e. g.*, tobacco-smoke, or chloroform. In such cases, the smell and the common organic effect will fuse together into one consciousness.

With gene-
ral organic
feeling.

Hence in man, smell, also, has a low place among the sources of knowledge. To many of the lower animals, on the contrary, it is a chief source of knowledge ; and some of them seem to think largely in terms of smell.

§ 64.

III. *Touch* is the sense through which the self becomes aware of contact between its organism and solid things external to its organism. Hence it differs from the other special senses in not being restricted to a single point of the surface, but extending over the whole. And from its being a response to surface-contact with solid things, it is by its nature the most primitive and necessary of all the senses, and common to the lowest sentient creatures.

Touch aris-
ing from
contact of
organism and
environment.

Hence some evolutionists have attempted to show that the other senses (with the exception perhaps of taste, the chemical sense) have been developed from touch, and are only more refined sensibilities to more delicate forms of contact. Thus, smell has been explained by contact with the molecules of certain

Hence
thought to
be the funda-
mental sense.

vapours and gases ; hearing by the pressure of atmospheric vibrations ; vision, by the shock of ethereal waves. These forces originally affected, it is supposed, the whole surface alike, but in course of time certain points came to be more sensitive to certain kinds of impact than to others, and by use became more and more adapted to special stimuli, producing different sensations.

But though widely diffused yet supplied with a special organ—the skin, which includes

But tactal nerves though not concentrated in one locality like those of other special senses, are not, like the organic nerves, without any specially adopted end-organ. The skin is really a highly specialised organ ; and (besides the other purposes which it serves) is specially adapted to the requirements of tactal sensation, and contains, embedded in it and protected by it, certain special end-organs of touch.

Epidermis,

For the skin consists of three layers. The outer layer or epidermis is a protective covering merely, without feeling. Under the epidermis is the sensitive layer composed of muscle-fibres with blood vessels, cells and nerves. Under this again, is a layer composed largely of fat-globules forming an elastic cushion for the sensitive layer to rest on. The fleshy and sensitive middle layer rises under the epidermis into small conical papillæ in clusters and rows—most thickly crowded on the most sensitive parts, as on the fingers and palms, where they are arranged in rows, making the overlying epidermis rise in ridges. Some papillæ contain only blood capillaries folded in loops, and nerve-endings that seem not to possess any special end-organs. But in the most sensitive parts, most of them contain an egg-shaped body, composed of one or more nucleated cells, into which one or several nerve-fibres enter. These are called *touch-corpuscles*. Other fibres, again, end in *bulb-like* swellings, different in structure from the corpuscles. The sensation arises from the epidermis being pressed down so as to compress the papillæ, and thus affect the nerve-endings contained in them.

And touch-corpuscles,

Hence it is supposed that the nerves without any special end-organs are the organic nerves by which we feel the pain of cuts and injuries of the skin ; and that the *corpuscles*, (or *bulbs* or both), are the organs specially adapted to produce the special sensation of touch when squeezed down by compression of the papillæ. Some, however, think that the *bulbs* are organs of temperature, giving feelings of heat and cold.

Giving Touch sensations,

Pure touch-sensations (apart from differences of local character) are few in number—chiefly contact, tickling, pressure. They are commonly mixed up with feelings of different origin, *viz.*, the muscular feelings of active effort, as in pushing, and the states of muscles and joints in doing muscular work. But as touch, especially when combined with muscle-feeling, is the source of important elements of knowledge, its *characteristics* require closer consideration—

(a) *Touch proper*, *i. e.*, the passive affection occasioned by contact and pressure (as opposed to *active touch*, which is properly muscular feeling of effort combined with touch-sensation) is moderately sensitive to differences of *quantity* or *degrees* of pressure. The hand resting on a table (and therefore without muscular effort) distinguishes increment of $\frac{1}{2}$ in the weight laid upon it. Thus if the weight be 9 oz. it requires to be raised to 12 oz. (*i. e.* multiplied by $1\frac{1}{3}$) to produce a distinguishable difference of sensation. Other parts, again, are less sensitive. Still this difference of degree is probably more muscular than tactile.

Including quantity—contact, pressure, resistance.

(b) It is specially sensitive, however, to differences of *extensive magnitude*, as might be expected from its organ being an extended surface. In other words, it distinguishes clearly between points pressing against the skin as giving *acute* sensations, and larger objects as giving *extensive* ones; and between surfaces of different magnitudes, *e. g.*, between a smaller coin and a larger one when pressed on the surface. In this way touch-sensation is of great importance as giving an understanding of co-existence as distinguished from succession, and thereby contributing to an understanding of space.

Extensiveness,

(c) As to its discrimination of *quality*, the qualitatively different feelings, of *hard* and *soft*, *rough* and *smooth*, have sometimes been brought under the head of touch, but they have as much of muscular feeling in them as of touch, proper.

And quality—hardness and softness,

In fact tactal sensation, though it gives one kind of knowledge of primary importance, does not present many differences of quality—apart from these minute differences known as local characters. By these we mean the differences of quality which are due not to any difference in the stimuli, but to the parts of the surface to which the stimuli

And local characters giving localization,

(otherwise identical) are applied and the nerve-endings, affected. Thus, when stimuli of the same kind (e. g., the points of compasses) are applied with the same degree of force to different parts of the skin, we find the sensations themselves to be so far different in *quality* that we can not only distinguish them from one another as sensations, but can distinguish the parts affected, and learn afterwards to *localise* the sensation in these parts (*i. e.*, feel it as caused by some state of these parts). Such qualitative differences, therefore, are not due to anything in the stimuli, but only to the localities in which the stimuli are applied; and the reason why different localities give specifically different sensations must consist in some specific *difference of the tactual nerves or end-organs* of these localities.

And making
distinguish-
able touch-

Different parts of the surface, however, differ greatly in their discriminative sensibility to points. The tongue is the most sensitive part, and can distinguish points not more than $\frac{1}{2}$ th of an inch apart. The finger tips come next, discriminating points $\frac{1}{2}$ th inch apart. But on the back, points must be $1\frac{1}{2}$ inch apart, to be distinguished from one another. We must suppose, therefore, that in such parts as the back, the nerve-endings must either be few in number, or less *specialized* so that their sensations are less distinguishable. Areas within which touch-points are not distinguishable from one another, and which must therefore be supplied each by a single nerve, are spoken of as 'touch-spots' or touch-areas.

Touch con-
tributes to
the under-
standing of
space by
giving the
consciousness
of co-existent
points on the
surface of the
body.

Hence, though the contributions of touch to knowledge depend largely on its conjunction with muscular feelings of movement and resistance (in what may be called *active touch*), the purely *passive* sensibility proper (*passive touch*) supplies at least one fundamental and essential element of knowledge, *viz.*, by means of the above discrimination of *local character*. For by means of this, it gives an understanding of a plurality of points existing simultaneously, and yet distinct from one another, and thereby gives the idea of *co-existence*. This understanding of distinct but co-existing point (when supplemented by the muscular experience of movement between co-existing points) enables us to arrive at an understanding of the *extension* and *position* of things in space, which is a fundamental constituent of our understanding of the external world. The physical world consists of objects (atoms, molecules, material things) *co-existing* outside of one another in space (as opposed to events succeeding one another in time). Hence to understand the world we must understand the co-existence of things and parts of things. This seems to be accomplished mainly by passive touch.

Sensations
of tempera-

But contact or touch proper is not the only surface-sensation. Heat and cold also are felt chiefly in the skin. But heat, cold

and contact seem each to have special nerves of its own. For there are small spots where only touch, others where only cold, and others where only heat is felt—"touch spots," "heat spots," and "cold-spots"—most thickly intermingled on the most sensitive parts. But touch and temperature, though discriminated most clearly on the surface, appear to be felt in some degree through the whole body (corpuscles and bulbs being found everywhere), and are therefore less differentiated from general organic feeling than the other special sensations.

ture—
are
they special
or organic?

§ 65.

IV. *Hearing*, though involving a more complicate and delicate mechanism than the preceding senses, is much better understood. The mechanism of the ear consists of two principal parts, the *drum* and the *shell*, with their contents. Thus—

Hearing.

Mechanism
of the ear.

1. *The drum*: the outer passage of the ear is terminated by an elastic membrane, forming the outer side of the *tympanum* or drum of the ear. Behind this outer membrane there is an air-cavity in the skull-bone—the hollow of the drum—communicating with the nostrils by a passage called the *Eustachian tube*. Across the cavity of the drum, from the back of the first membrane on the outer side, to another membrane covering another cavity in the bone on the inner side, stretches a bridge of three small bones:—

Outer drum
membrane.

(1) The *hammer bone*, attached by one end to the back of the outer drum-membrane, and by the other end, to the next bone called the *anvil*;

Chain of
bones.

(2) The *anvil-bone*, with two feet (so to speak) one resting upon the skull-bone on the inner side of the cavity and serving as fulcrum, and the other pressing upon another bone called the *stirrup*;

(3) The *stirrup-bone*, attached by its outer end to the anvil, but with its inner stirrup-like end pressing upon the inner drum-membrane, covering an oval aperture in the skull-bone on the inner side of the drum-cavity.

Inner drum-
membrane.

2. *The shell*: behind this inner membrane is a winding shell-like cavity in the skull-bone, called the *cochlea* (snail-shell), from its shape, filled with a liquid called the ear-lymph. The fore-part of the shell, called the *vestibule*, has three hollow ring-like passages on its top, called the *semi-circular canals*. The

The cochlea.

Its vestibule and rings with ciliated cells :

vestibule and its canals are lined with membrane, and in this lining membrane there are *nerve-cells* embedded, with hair-like projections of their protoplasm, called *cilia* (eye-lashes), projecting into the lymph.

Its spiral passage—divided longitudinally by the basilar membrane,

The winding tube of the cochlea beyond the vestibule (called the *labyrinth*) is divided for the greater part of its length into two passages by a longitudinal partition, formed, for part of its width, of a plate of bone and for part, of an elastic membrane, called the *basilar membrane*. Resting on this membrane as their *base*, there are parallel rows of string-like, ciliated nerve-cells, some 20000 in number, attached at their lower ends to the membrane, and supported at their upper ends by a row of stiff rods rising obliquely from the membrane. (These rows of string-like cells and supporting rods

Supporting the rod and cells of Corti.

form the *organ of Corti*, which has been compared to a musical instrument with wires or strings). Indeed the basilar membrane itself appears to be a tissue of transverse elastic strings, growing shorter as the passage becomes narrower. And besides these, there are small granules like grains of sand (called *otoliths* or ears-stones) lying loose in the lymph.

The nerve-cells (both those contained in the lining of the canals and vestibule, and those resting on the basilar membrane and supported by the rods of Corti) give out nerve-fibres, which unite and form the *auditory nerve*, which passes through a hole in the skull-bone to the brain.

Hence, mode of operation.

Mode of operation : from this we can understand its mode of operation. Waves of atmosphere, flowing up the outer ear strike against the outer drum-membrane and set it vibrating. Its vibrations pull and press upon the chain of bones ; and the innermost bone (the stirrup) pulls and presses on the inner drum-membrane (closing the cochlea or shell on the inner side of the air cavity), and sets it also vibrating. The vibrations of the inner drum-membrane, again, send waves of ear-liquid pulsating through the canals, and down one passage of the winding shell, and up the other—brushing against the ciliated cells of the canals and making the basilar membrane vibrate, with the strings and cells of Corti ; and apparently rolling the *otoliths* along the vestibule. And our different sensations of sound arise from the different ways in which the cells are thus

Waves of liquid stirring cilia and strings of Corti.

affected by these agencies. It has been supposed that the stirring of the ciliated cells of the canals produces confused noises; and the vibrations of the basilar membrane, musical sound.

But it has been found that the fibrils from the *ciliated* cells of the canals and vestibule do not go all the way to the cerebrum, but branch off from the main nerve and enter the cerebellum. This has led many to think that these cells have nothing to do with sound, but with the feeling of the equilibrium of the body. If this be so, then the cells of the basilar membrane and organ of Corti will be the real organs of hearing. It will follow that the flowing and swaying of the ear-lymph will give not only sound but also the feeling of equilibrium, *viz.*, by affecting not only the strings of Corti but also the cilia of the canals.

But use of canals and otoliths, doubtful.

§ 66.

The characteristics of sound, therefore, will correspond to those of the atmospheric vibrations which give rise to sound.

The know-ledge-giving characters of sound,—
Quality including Intensity,

(a) The *intensity*, or loudness of sound will depend on the force with which the waves of atmosphere are propelled against the drum-membrane; and therefore on the force of vibration of the body which communicates the wave motion to the atmosphere, and the wave-length or size of the waves communicated. The ear can distinguish increments of $\frac{1}{4}$ th of the impelling force.

(b) The *volume*, *mass*, and *extensity* of sound will depend on the area, or rather the number, of the sounding objects. Thus, the waves of the sea, the far extending reverberations of thunder, the many instruments in a band of musicians, produce the effect of volume, as contrasted with the diminutive impressions made by the ticking of a clock, or chirping of a bird. It is obvious that only one sound can cross the bridge of bones at once, but sounds may succeed one another so rapidly that, by their property of duration, many sounds may be present in mind at once, and produce the effect of volume.

(c) But the most interesting of the characteristics of sound come under the head of *quality*, which is found to depend on the rapidity of the vibrations, or number per second. This

And volume,

Quality, including

characteristic includes *pitch*, *timbre* and *harmony*, which are most conspicuous in *musical* sounds, but enter into *noises* also :—

Tone,

(1) Differences of *pitch* or *tone* (place in the musical scale) are proved by experiment to depend on the rapidity of the successive waves, and therefore of the vibrations which cause them. When the number is under 20 per second they do not produce a continuous musical sound, but only confused beats or shocks (noise); but when the vibrations rise above 20 per second, their effects begin to run together in consciousness into one continuous sound. It is at first low in pitch, and harsh and grating to the ear. But as the rate of vibration increases in geometrical progression, the pitch rises in arithmetical, and becomes first the *bass* sound as used in music; and then at, 2000 or 3000 vibrations per second, it rises into a high *treble*; and beyond 4000, becomes too high, sharp, and harsh for musical purposes. Beyond this, however, the rate of vibration may still be increased, until at about 40,000 it ceases to affect ordinary ears, and passes out of the range of sound-sensation altogether.

**Rising from
bass to
treble.**

Individuals will, of course, differ greatly in their power of discriminating changes of pitch. Musicians must be specially endowed with this kind of sensibility, and in this consists what is called 'ear for music.'

And timbre.

(2) *Timbre*: but differences of pitch do not exhaust the differences of quality. Voices and instruments sounding the same pitch may, nevertheless, be qualitatively different. The additional difference of quality which is found in sounds of the same pitch, is called *timbre*. It has now been proved to be produced by secondary waves of vibration combining with

Or overtones,

every fundamental wave. Thus, when a string is set vibrating, not only does it vibrate as a *whole*, with one curve from end to end (making the fundamental wave), but at the same time smaller vibrations are running along the main one, making the wave to be compound, including the one fundamental, and the many secondary waves. Hence, while the fundamental wave tends to produce one *fundamental* or *ground tone*, the secondary waves included in it tend to produce *overtones*; and the mingling of different overtones with ground tones produces the differences called *timbre*.

(3) *Harmony* and *discord*, again, are qualities brought out by two or more tones of different pitch and timbre, sounding together or in close succession. They may be so consistent with one another, that the conjunction of the two in consciousness produces an agreeable, soothing or exhilarating effect (harmony, the greatest amount of consciousness with the least amount of effort and strain); or they may be so inconsistent with one another, that the attempt to combine them in consciousness produces a painful feeling of straining, tension, and effort (discord), which soon produces weariness and fatigue.

This effect may arise partly out of the physical processes of nerve and brain. These may be such as to help and further one another reciprocally, and result thereby in a harmonious compound process; or they may be such as to hinder and obstruct one another, and result in a conflict of forces, and "wear and tear" of tissues.

The difference between *musical sound* and *noises* seems to consist mainly in this—that in the former, the vibrations run on *continuously*, flow into each other and rise and fall gradually, making it easier for organs and mind to follow them; whereas in the latter, the vibrations are little more than a succession of *unconnected beats and shocks, beginning and ending abruptly*, and therefore more or less discordant, and fatiguing to follow.

But the very abruptness and brevity which makes noises to be more fatiguing to the ear, makes them to be more useful for *representative* and *intellectual* purposes, because it makes them more easily distinguished from one another. Hence noises serve the purposes of intellect, (*viz.*, in speech) while musical sound appeals more to feeling. The sounds of nature are mostly noises while musical sounds are mainly the production of man for emotional effect.

And hence nature has selected noises as the easiest and most effective way of representing ideas, and has provided men with an elaborate mechanism for the production of noises, *viz.*, the *organs of speech*. Versification is an attempt to soften the abrupt shocks which articulate noises give to the organs of articulation and hearing, and overcome their discordance. Singing is an attempt to transform the noises of speech into musical sound, and therefore appeals more to emotion than to intellect. The distinction between different voices seems to depend mainly on their timbre.

Harmony and
Discord.

A combina-
tion of activi-
ties which
either help
and promote
one another,

Or resist one
another, pro-
ducing wear
and tear.

Musical
sounds and
noise;

Use of noises.

Speech, metre
and song.

§ 67.

V. *Sight* is by far the most delicate and refined of human sensibilities, in respect of both quantitative and qualitative

Physical
cause and

range of
vision.

Limits of
vision.

Medium of
vision.

Two kinds of
ocular sen-
sibility, op-
tical and
muscular.

And two
kinds of
physical
apparatus.

discriminations. Seeing like hearing, is occasioned by *wave-motion*, but there is this vast difference in respect of delicacy : hearing ceases at about 40,000 vibrations per second, while sight only begins (it has been estimated) at 456 billions per second (*viz.*, in red light), and continues sensitive up to 750 billions (in violet light). For the vast interval between the highest limit of hearing and the lowest limit of seeing, and for the region above the highest limit of sight, man has no sensibility, though other beings may have. Hence beings may be conceived to exist capable of feeling and producing waves of force of intermediate and higher rates, which are not directly manifest to human sense. It is well-known that chemical and other effects are produced by rays of both lower and higher rates than those of light, without affecting any of our senses directly. The so-called X-rays, which pass through solid bodies impenetrable to ordinary, light-rays and which, though themselves invisible, produce visible chemical effects, seem to be due to the ultra-violet region of the spectrum.

But vibrations of such minuteness and rapidity cannot be conveyed by such a heavy substance as atmosphere. They imply the existence of a luminiferous *ether*, pervading interstellar space, and all but perfectly elastic, so that waves are propelled from luminous bodies through the ether of space at the rate of 185000 miles per second. Light waves differ from sound waves however, not only in their excessive rapidity, but also in their being transverse, *i. e.*, vibrating at right angles to the line of propulsion.

Now the organ specially adapted for being affected by ethereal tremors and transmitting their effects to the brain, is the eye. We have to consider, therefore, the mechanical structure of the eye, its mode of operation, and the various sensations which it is the means of producing. We find, however, that there are two kinds of sensibility produced by the working of the eye, both of the utmost importance intellectually, *viz.*, the *optical sensibility to light and colour*, affected by ethereal undulations and peculiar to the eye ; and *muscular sensibility to strain and movement* which, though not peculiar to the eye, yet attains in it its greatest delicacy. Therefore, we have to consider the physical apparatus of the

eye by which sensations are produced and the eye sensations themselves, and in dealing with the apparatus of the eye we have to consider both its optical and its muscular apparatus, Thus—

§ 68.

Structure of the Eye.

The *physical apparatus* of the eye, will include :—

I. The *optical* apparatus for producing sensations of light and colour, which is contained within the eye-ball.

The ball of the eye is formed by a tough opaque shell called the *sclerotic* (or rough) coat, kept in its place by six muscles attached to it externally. A round opening in front of the sclerotic is closed by a transparent covering, shaped like a watch-glass, called the *cornea* (window of transparent horn) through which light passes into the interior of the ball. Inside, and at some distance behind the cornea, is the double-convex *lens*, clasped round the edge and held in its place by a ring of muscle projecting from the sclerotic, called the *ciliary* process or muscle. In front of the lens, between it and the cornea, is an upright screen called the *iris*, with a round opening in the middle called the *pupil*, which contracts and widens automatically so as to lessen or increase the amount of light admitted to the lens. The spaces between the cornea and the lens, and the lens and the back of the eye, are filled with liquids called the *humours*.

But the above are only mechanical arrangements for admitting, regulating and focussing the light. The vital and sensitive part is the *retina*, or net-work of nerves and nerve-cells, which forms a layer spread out on the back part of the interior of the eye-ball behind the cavity, in such a way that waves of ether, entering by the cornea, are brought to focus upon it by the lens. The retina is formed by the optic nerve entering the eye-ball from behind, and spreading out into a layer of fibrils and protoplasmic cells. It is hardly more than $\frac{1}{50}$ th of an inch thick, but is extremely complicate, and includes several thinner layers :—

(1) On its innermost surface (*i. e.*, nearest to the centre of the eye-ball, and therefore to the lens and the light) is the *net-*

The physical apparatus of the eye :

1. *Its optical apparatus for producing vision,*

Sclerotic,

Cornea,

Lens,

Pupil,

Humours,

Retina.

Structure of retina : its five principal layers—

The network proper.

Ganglion
cells,

Granular
cells,

Rods and
cones,

And layer of
pigment.

Mode of
operation :

The rods
and cones,
the ultimate
organs of
vision,

The blind
spot,

The *macula
lutea* or
yellow spot,

The 'visual
substances,'

work formed by the fibres themselves, spreading out from the optic nerve, and turning backwards into the layers behind them ;

(2) Behind this surface net-work of fibrils is a layer of *branching nucleated cells*, like the ganglion cells of the brain, into which the fibrils from the surface enter ;

(3) Behind the branching cells, again, are several layers of small *roundish nucleated cells*, through which the fibrils from the outer layers pass farther backwards ;

(4) Behind these is a layer of symmetrically shaped *rods and cones* laid horizontally—themselves modified cells—in which the optic fibrils finally terminate (after passing backwards through the three outer layers) ; and—

(5) Finally, behind the rods and cones is a layer of *black pigment granules*, called the *choroid coat*, the object of which is, apparently, to absorb the superfluous light which passes through the other layers.

Mode of operation : From this we can understand the mode of operation. The ethereal vibrations, concentrated on the retina by the lens, pass through the transparent inner layers, (those nearest the lens), and produce some effect in the *rods and cones* (probably), which is communicated through the intermediate granular layers to the ganglionic cells ; and these appear to generate the force which flows along the optic fibres to the brain, and is followed by sensations of light and colour.

It is probable, therefore, that the rods and cones are the end-organs specially adapted to give rise to optical sensation. That the optic nerves are not themselves directly sensitive to light, is proved by the fact that the point where the optic nerve enters and passes through the retina, before spreading out on its innermost surface, and where the other elements therefore are wanting, is a *blind spot* ; while the most sensitive part is a *hollow yellow spot* in the centre of the retina (called the *fovea centralis*, or central pit), where the outer layers thin away, leaving the layer of rods and cones more directly exposed to the light.

The effects produced by the rays in the rod and cone cells are doubtless chemical changes. These cells seem to contain, along with their protoplasm, certain unstable substances which are decomposed by the different light-waves ; while the decomposition of these different substances affects the protoplasm of the different cell ; and the different effects thus produced, being propagated to the brain, enter into consciousness as sensations of light and colour. Of these photo-

chemical substances only one is as yet known (called 'visual purple,' found in the rod cells, and changed to white by the action of light), but there must be many more. These effects may be analogous to the photo-chemical changes known to be produced by light in the coloured substances contained in the leaf and flower-cells of plants, giving them their various colours under the action of light.

II. The muscular apparatus of the eye consists of an arrangement of muscles for holding the eye in its orbit, turning it in different directions, and adapting it to different distances; and which, in doing so, give rise to certain muscle-feelings which combine in thought with the optical sensations, and give knowledge of the distances and directions of the things seen. Thus—

(1) *Inside the eye-ball* there is the ciliary process and muscle, which forms a belt about the lens, and by its contraction and expansion increases and lessens the convexity of the lens, and thereby enables it to focus light from different distances on the retina.

The lens is naturally elastic, so that it can be made more convex for short distances, and flattened for long ones, by the working of the muscle. But when the lens loses its elasticity, the eye has no longer the ability to focus light from different distances on the retina. The lens may remain too convex, and thus bring light to a focus before it reaches the retina. This defect of the eye is called *myopia*, (near-sightedness) and can be remedied by the use of concave glasses to compensate for the convexity of the lens. Or it may remain too flat, and make light converge to a focal point behind the retina. This is called *hypermetropia*, (far-sightedness) and remedied by convex glasses to make up for the flatness of the lens.

(2) *Outside the eye-ball* are six strips of muscle, each attached to the skull-bone at one end, and at the other end to the exterior of the eye-ball; and adapted to roll the ball in its orbit, so as to enable the lens to receive light from different directions. These include (i) four muscles called *recti* or straight, attached to the ball above and below, on the right and on the left, and adapted to turn the eye *straight* upwards and downwards, inwards and outwards; and (ii) two called *obliqui*, for rolling it in oblique directions.

The ocular muscles are abundantly supplied with both *motor* and *sensory* nerves, and are in fact the most *sensitive* muscles in the body to degrees of movement and differences of direction;

II. Its muscular apparatus for producing movement.

Internal ocular muscles, viz., the ciliary for holding the lens;

External, viz., the straight and oblique for turning the ball.

and their muscular sensibility will be found to be the source of important elements of knowledge.

§ 69.

The Sensibilities of the Eye.

The sensations of the eye,—

We have to consider next the sensations of the eye—(I) the purely *optical* sensibility of the eye, (*i.e.*, the sensibility of the *retina* and *optic nerve*) giving *light* with its different degrees of intensity (constituting *light* and *shade*), and its different modes or qualities (constituting the *colours*), and (II) its muscular sensibility, giving the most delicate discriminations of movement and direction.

I. Optical sensations,

Light, *I. The optical sensations of the eye:* It is found that light, like sound, is produced by wave-motion; and that its waves are not simple but compound, each fundamental wave including many smaller but much more rapid ones within it; and that it is the series of entire compound waves, striking against the retina simultaneously or in rapid succession, that give the sensation of *white* or pure light.

Colours,

Simple and compound.

Theories of colour.

But it is found also that the compound wave can be broken up, and that its constituent waves (being of different lengths and rates of vibration) can be separated and turned in different directions (as is done by passing them through a prism), and that, when thus made to act separately, they produce different colour-sensations. And it is found that, when each is taken as far as possible by itself, it gives what appears to be a *simple* colour; but that, when they are combined in different ways, they give many different *compound* or *derivative* colours; and that objects have the property of absorbing some of the colour-waves (turning their force into the form of heat or chemical action), and of casting off or reflecting the rest into our eyes, so that the reflected waves determine the colour of the object to consciousness. Newton supposed that there are seven simple colours in the solar spectrum—red, orange, yellow, green, blue, indigo, and violet—and that all others are blends of these; but it is now known that some of these are themselves blends. According to another theory (Young's) there are only three fundamental colours, red, green and violet, corresponding to three specifically different kinds of rod and cone cells and of photo-chemical substances contained in them, and three kinds of optic fibrils; and all

others are blends of these. But neither these nor any of the other theories advanced to explain the colours, is altogether satisfactory.

And not only does the conjunction of them all in one compound wave give the sensation of *white*, but it is found also that the combination of certain pairs produces the same effect. Thus if the ten colours—red, orange, yellow, yellow-green, green, blue-green, indigo, violet, and purple (violet-red)—be arranged round the circumference of a circle, every pair of opposites will be found, when combined to produce the sensation of white light. Such pairs are therefore said to be *complementary*. Thus red and greenish blue, purple and green, are complementary colours. Hence consider

Complementary colours.

The eye as a source of knowledge: Now these facts enable us to understand the different *characteristics* of optical sensation and the knowledge which they give.

The knowledge-giving characters of optical sensation—

(1) *Intensity* of visual sensation, or brightness of light and strength of colour, will be due to the closeness with which the luminiferous vibrations follow one another into the eye. The greater the number in a given time, the stronger is the light or colour ; the wider the intervals between them, the fainter the sensation produced. In the case of white light, higher and lower degrees of intensity constitute the different degrees of light and dark, from the intense brightness of sunlight down to the waves at intervals which make twilight, and to the absence of all light-vibration, which constitutes darkness. When colours are reduced in intensity by being mixed with white, they are said to be saturated.

Intensity ;

(2) *Quality*, or differences of colour, will arise from the disruption of the compound wave of white light into its constituent waves, and the reception of these into the eye either singly or in various combinations. Of the simple waves, red, it is known, has the widest and slowest wave, being close to the lower threshold of sensibility (about 450 billions per second) ; while violet is at the other end of the scale, having the smallest and most rapid wave, and standing at the highest limit of optical sensibility (over 700 billions).

And quality.

Waves larger and slower than red, and smaller and more rapid than violet, do not affect the eye, but may manifest themselves otherwise, *e.g.*, by producing chemical changes, and are known as chemical rays, X-rays, etc.

But there is such a thing as *colour-blindness*, or insensibility to colour, partial or complete. Most frequently it

Colour-blindness.

manifests itself merely as an inability to distinguish certain colours from one another. The colours most liable to be confounded or identified are red with greenish black; yellow with violet; purple and green with blue; all light shades of colour with white; and all dark shades with black. Occasionally it appears as insensibility to all colour, leaving only light and dark with their mixture, grey. To persons completely colour-blind the world appears like a picture in shades of black, white and gray. The solar spectrum appears like a strip of paper shaded light and dark with a pencil—brightest at the centre (over green), and darkest at the ends (over red and violet).

Supposed development of colour sensation in historical times.

Complete colour-blindness is rare, but smaller irregularities of colour-vision are common; and for employments requiring discrimination of colours, candidates are now subjected to rigorous colour tests. It has been observed that in ancient languages, as Greek and Sanskrit, the words for colour are much fewer than in modern languages. From this some have inferred that in ancient times people were less sensible to varieties of colour than they are now, and that the colour-sense, therefore, has undergone much differentiation since ancient times. Savages at the present day are usually found unable to distinguish the colours of short wavelength (*i. e.*, those of the violet end of the scale). Children appear to be at first colour-blind. They begin by distinguishing the long-wave colours, red and yellow; but appear not to distinguish the short-wave ones until they are four or five years of age. Colour-blindness is probably due to the absence of some of the photo-chemical substances from the rod and cone cells.

Extensivity.

(3) As to *extensivity*—the retina is a surface, and light and colour are given as extended surfaces, *i. e.*, as having extensivity. But to us, at first, extensivity is only a mode of sensation. To understand the *meaning* of their extensivity, *i. e.*, to understand light and colour as attributes of something extended in space, requires the co-operation of the muscular sensibility of the eye, in conjunction with the optical. It is its muscle-feelings of strain and movement that give the surface-magnitude, form and position of coloured things. It is by its feelings of movement over shaded and coloured surfaces that the eye co-operates with touch and muscular feeling of the limbs in contributing to the understanding of space and extended things in space.

Superiority of vision.

Hence, the delicacy of its discrimination of *number* and *extent*, *form* and *direction*, combined with that of light and colour makes the eye to be the most *presentative* and *intellectual* of the senses, *i. e.*, the one which presents to the mind the greatest number of differences and relations of external things. The most fundamental relations indeed are given by touch and

muscle-feeling, but we learn to interpret these by vision also, so that at last vision comes largely to supersede the other senses, so that we think and represent the world to ourselves largely in terms of vision.

II. The muscular feelings of the Eye: The eye is provided also with muscles—the ciliary muscle which increases and lessens the convexity of the lens, and the external muscles which roll the eye-ball in its orbit. These muscles are provided with nerves of both kinds, which make the eye to be extremely sensitive to different degrees of effort and movement. Thus the nerves of the ciliary muscle give a very delicate feeling of the degree of energy with which the lens has to be compressed to adapt the vision to different distances ; and this feeling becomes associated with the distances of the objects viewed, and thereby suggests to us their distances when we see them. The nerves of the external muscles give us an understanding of the directions and solidity of things, as has to be explained elsewhere.

Thus the eye is a source of knowledge not only by its optical, but also by its muscular sensibility.

II. The muscle-consciousness of the eye.

C.

Muscle-Consciousness.

§ 70.

Finally, the *Muscular Consciousness* is of much importance psychologically, as supplying (in conjunction with touch and vision) the most fundamental and essential elements in our idea of the external world, *viz.*, our understanding of the impenetrability, extension, and position of things in space. For though it contains elements which are of the nature of passive organic sensation merely it contains others of a different kind which make it to be a principal source of knowledge. Hence it requires separate consideration.

Muscle-feeling combined with touch, a source of fundamental cognitions.

By *muscular consciousness*, or *muscle-feeling*, we mean that form of consciousness which we experience, when, by a voluntary effort, we move our limbs, lift a weight, or push a resisting object, and which we learn to localise vaguely in the muscles with which we perform the work.

Structure of Muscle—

The muscles themselves are the strips or bands of flesh, which assume at each end the form of ligaments, and attach

Flesh,

themselves thereby to the bones ; and by their contractions (when stimulated by out-going currents of nerve-force from the centres) pull inwards the bones to which they are attached, and thereby produce movements. Thus in the case of the limbs, they are attached to the bones above and below the joints ; in the case of the eye each of its six external muscles is attached at one end to the skull-bone, and at the other to the eye-ball.

Fibres,

These bands of flesh are found, on microscopic examination, to be composed of bundles of *fibres* (each fibre being about $\frac{1}{500}$ th of an inch in diameter) ; and the fibres are found to be bundles of still smaller *fibrils*. In the case of those muscles which are under the command of the will (called *voluntary* muscles), the fibres are distinguished by transverse lines, called *striae* (stripes), as if they were composed of discs having their flat sides laid on one another (like a row of coins joined together by their flat sides). This gives voluntary muscles a peculiar striated, or cross-striped appearance. The fibres are formed, by modification, from rows of protoplasmic cells, which first lengthen out cylindrically and assume at last the segmentation into discs or cross-sections, which gives them their striped appearance.

Motor nerves.

Now the motor nerve-fibres terminate in these muscle-fibres—apparently in the nuclei of the original cells out of which the fibres are formed. The outgoing currents of nerve-force (flowing outwards at command of will, and accompanied by the active consciousness of effort) flow in successive pulses or waves into the protoplasmic contents of the discs. There they cause, in some way, that shrinking of their contents which flattens and shortens the discs, and thereby the fibres and bundles as wholes, and thus moves the limb or organ. When the motor stimulus ceases, the fibres return automatically to their normal length. The repeated contraction of the fibres involves an expenditure of force, and the force is evolved by consumption (apparently oxidation) of the materials of the discs, which have constantly to be renewed from the contents of the blood.

Mode of operation,

Sensory and motor nerves.

And besides the ends of motor nerves, through which the work of muscle is stimulated and kept up, the bundles contain also *sensory nerve-endings* ; so that their contractions and expansions, freshness and fatigue, are reported to mind by inward

currents and felt as *passive* muscle feeling. Thus, *while outward going currents are producing movements, inward ones are producing sensation.*

And the *active* consciousness of putting forth effort to produce movement, and the sensation or *passive* consciousness, of the states of muscle produced by the movement, become blended together in one compound muscle-consciousness; in which, however, the one or the other may predominate, giving the whole a predominantly active or passive character.

The outflow of energy from the centres seems to take the form of successive waves or pulses of excitation. These nervous pulses follow one another rapidly in freshness and health, and more slowly in weakness and fatigue. The power of the muscle-fibres to contract when stimulated by nerve-waves depends on their containing sufficient materials for oxidation, and on the waste products of oxidation being promptly removed by secretion and respiration. The causes of fatigue may lie in the muscle-fibres themselves—in their material being exhausted, or in their being impeded (practically poisoned) by accumulation of waste products. Or it may lie in the centres and nerves which keep up the work of muscle—in these being exhausted or impeded. As the amount of stimulating force from the centres is small compared with the working force generated in the fibres themselves, it may be inferred that fatigue is mainly muscular. There is some evidence, however, that it is really due more to failure of the very delicate nervous mechanism than to that of the coarser muscular apparatus.

Active and passive consciousness.

Nerve-force and muscle-force.

What is the nature of fatigue?

§ 71.

Muscle Consciousness.

Hence this muscle-consciousness, though it appears to be simple, is really complex, and includes two constituents of opposite character and origin, *viz.*, *passive* and *active muscle feelings*—a consciousness of acting and being acted on. Thus it contains

Complexity of muscle-consciousness, including

(a) An element of what may be called *active* consciousness or conscious conation and activity, *i. e.*, a consciousness of *acting* as opposed to that of being acted on. For when we move a limb, lift a weight, or resist a force, we are conscious of *effort*, or *expended energy*, to overcome the weight and inertia of the limbs and the resistance of external things. And this consciousness appears to be a consciousness, not solely of the *passive effects* produced by effort, *viz.*, the changed conditions of the muscles and joints, (as reported by incoming currents); but also of the *concentrating*

(a) Active consciousness of effort and activity,

and *putting forth* of energy by the self—and therefore connected with 'innervation', or the discharging of energy along *outcarrying nerves*. In other words, in being conscious of being resisted and acted on by other things, we are conscious of the *activity of self* in acting on and resisting the reaction of other things.

Accompanying innervation.

This consciousness of *innervation*, therefore, will be the opposite of sensation. For sensation is a *passive* consciousness, in the sense that it rises from incoming currents affecting the thinking self—a consciousness of *being affected* or *acted on* through afferent nerves. This, on the contrary, will be a consciousness connected with the getting up and discharging of force by the afferent nerves, and therefore of *acting*, instead of *being acted on*; and, in this sense, an *active*, instead of a *passive* consciousness.

Not a consciousness directly of nerve currents, but of energy which produces them.

It is not to be supposed, however, that active consciousness gives *directly* any knowledge of outgoing currents and nerves as such. Consciousness tells nothing *directly* about brain, or nerves, or currents outgoing or incoming. What we are conscious of is ourselves putting forth energy to preserve and perfect ourselves under the guidance of idea and desire, and the difference between energy resisted and energy having free expansion towards its ends—in other words, between acting and being acted on. It is only subsequently that we learn that mental activity expresses itself outwardly in an organic overflow, and that our energy performs its work by means of nerve-currents and out-carrying nerves.

(b) And passive consciousness or sensation,

(b) But muscle-consciousness includes also elements of *passive feeling*, or sensation proper, *i. e.*, a consciousness of being *acted on* and *affected*, as opposed to that of *acting*. Thus it includes—

Including muscle and tendon sensation proper,

(i) *Muscle-sensation* proper, or the passive feelings produced by the changing states of the muscles, tendons, and joints resulting from effort and movement. For every movement and muscular exertion produces a change in the state of the fibres of the muscles concerned (*viz.*, from their alternate contraction and relaxation), a friction of the joints, an evolution of heat in the limb, tension and compression of the skin, increased circulation, exhilaration or fatigue, etc.; and these changes in the limb affect the ends of *incarrying nerves* contained in the limb, and thereby make themselves felt in consciousness by *ingoing currents*. The consciousness thus produced therefore, will be of the nature of *passive affection*, or *sensation* properly so called, and akin to organic sensation.

Joint-sensation,

Skin-sensation,

Organic-sensation,

Nor are the organic effects of physical work limited to the muscles which perform it. They spread through the whole organism, as is seen in increased beating of the heart, rapidity of circulation, heavy breathing, increase of heat everywhere, perspiration and other secretions. All these organic changes produce corresponding feelings which blend with the local feelings of the muscles directly concerned, into one mass of organic sensation.

(ii) And an element of passive sensation of the special kind also, *viz.*, of touch. For we cannot move our limbs without coming into contact with something, though it should be only the air. Hence muscle-feeling, active and passive, is always combined with tactile sensation, which blends with the above passive feelings resulting from the changing states of the muscles and organs, into one mass of passive consciousness. This tactile element serves the important purpose of guiding the movements, which would otherwise be random and unsuccessful—as is found to be the case when the carrying nerves are in any way interrupted.

And tactus
sensation
which
guides the
movements.

And as the outgoing currents in which active effort realises itself, and the incoming currents which report the changing states of the muscles and skin, are practically simultaneous, therefore these active and passive elements all blend into one mass of consciousness which from its principal constituents may be called muscular. As touch is combined with muscle-feeling in its most important discriminations, the term *active touch* is sometimes used to denote the combined exercise of muscular and tactal experience.

Hence,
'active' touch.

§ 72.

Muscle-Consciousness as a source of knowledge.

Now the different muscular experiences will be distinguished, like the different sensations proper, by differences of *quantity* and *quality*, and these are elements of knowledge.

1. As to the *quantity* of the muscular consciousness with its active and passive elements,—the quantity of the *active* element will consist in the amount of conscious *effort*, *conation*, or *will-power* (concentration, continuation, and strain of volition) put forth to overcome the resistance. This energy of will will determine first the quantity of force evolved in the brain and discharged by outgoing nerves; and then, the quantity evolved within the muscle-fibres themselves (by oxidation), and thereby the intensity of the force with which the muscles

These muscle-
experiences
have
differences
of quantity,
which
pertain
chiefly to the
active
element
in them,

contract to move the limb and overcome external obstacles, as in lifting weights—a pound or stone or hundred-weight—mounting a stair, or walking a mile. Hence this experience is the principal source of our knowledge of weight, solidity, magnitude and distance.

Which will determine the quantity of passive feeling;

And differences of kind which pertain chiefly to the passive element,

And include the differences between

(a) Feelings of position,

(b) Feelings of unimpeded movement, including those of—

And the degree of the charges thus produced within the limb will determine the force of the ingoing currents which report them, and thereby the quantity or degree of the element of passive sensation which enters into the muscular consciousness—the feelings of tension, heat, friction, fatigue, etc.

2. As to the *quality* or *kind* of muscular consciousness,—specific differences of quality will arise mainly or wholly out of the *passive* or *sensuous* elements of that consciousness. For the exercise of will effort in itself will be *qualitatively* the same in all cases; so that differences of quality will depend directly on the *effects* which the effort produces, as reported by the incoming currents.

But these effects themselves, again, will depend on the presence, degree and duration of the effort and the outgoing currents. Hence muscle-feelings in respect of quality, may be divided into three classes according as effort is *absent*, or takes the form of *free-movement* through space, or that of *impeded movement*. Hence there will be—

(a) Muscle-feelings of *position* without effort and outgoing current, *viz.* the passive feelings of the states of the muscles, skin and joints which are felt when a limb is allowed to *rest* in a particular position, without any active effort either to remove it, or to keep it there. Some muscles are felt to be in a relaxed state, and others distended. Part of the surface is felt to be in unchanging contact with other surfaces and other parts. The regular flow of blood and repair of tissues make themselves felt in contrast with the tension, heat and fatigue of changing states.

Such feelings will at first be restful and agreeable, but will gradually change into weariness, until at last effort will be needed to keep the limb in the same position.

(b) Muscle-feelings of *free-unimpeded movement* through space, in which the continuous exercise of one set of muscles (as in moving the hand through the air) and the alternating rhythm of the muscles of different sides of the body as in walking, give different kinds of *passive* muscle-sensation;

which fuse with, and colour the *active* consciousness of the efforts to keep the limbs in motion. And these muscle-feelings of unresisted movement will differ in kind according to—

(1) The different *directions* of movements, because different directions employ different muscles, giving different shades of passive feeling, as in moving the hand up or down, tracing a square, circle, ellipse ;

(2) The different *ranges* of movements, or *distances* traversed—an inch, a foot, a yard, a mile—which give feelings differing in duration and degree, including of fatigue.

(3) And the different *velocities* of movement—for feelings of movement will differ according to the rapidity with which the muscle-changes of tension and relaxation are made to follow one another. A moving limb may take the same time to traverse a yard, a foot, or an inch, but the kinds of consciousness given by these movements will be different owing to differences of speed.

But a distinction has to be made between active and passive movement. Our movement is *active* when we ourselves move our limb by our own will and effort, as supposed in the above examples. It is *passive* when another person moves our limb for us, and we ourselves do nothing but submit to the movements, as when the teacher guides the hand of the pupil in teaching him to write or draw. In the latter case the active element of muscle-consciousness—the feeling of innervation—will be entirely absent ; only the passive elements will be left.

Active and passive movement;

(c) Muscle-feelings of *impeded movement*, resistance, or dead strain, as in lifting, pushing, pulling, resisting ; which are of the utmost importance psychologically, as giving the ideas of impenetrability and solidity, weight and inertia, in their different degrees, which are the fundamental elements in our conception of matter and the external world. The chief element in this form of the muscular consciousness, will be the *active* consciousness of effort in its different degrees—the amount of energy exercised by the will. But the effort will be coloured by the passive muscle-sensations arising from the tactful contact and pressure accompanying it—the continuous tension of the muscle-fibres (as contrasted with the *alternate rhythm* of free movement), the evolution of heat, the fatigue of the limb, etc.

(c) And feelings of impeded movement,

Giving empty space and filled space, or bodily resistance.

And the contrast between the muscle-feelings of free movement and those of impeded movement or resistance, forms the basis of our distinction between empty space and filled spaces or matter; because our idea of matter is essentially an idea of what *resists* our movements, and that of empty space, an idea of what makes free movement in all directions possible.

It is to be remembered, however, that the muscular feelings arising out of position, direction, range and velocity, are not accompanied at first by any understanding of extension in space, nor therefore, of the real meaning of position distance, etc. The child has to learn the *meaning* of its muscular feelings, and to know that they are the mental equivalents and representatives of extra-mental relations of things. And the understanding of muscular and other sensation is *perception*.

§ 73.

Theory of muscular automatism.

The above distinction between passive and active consciousness leads to the conclusion that mind is an active principle, conscious of directly controlling its organism.

But some deny the distinction;

The so-called consciousness of putting forth effort is an illusion;

Action of organism is really automatic;

We are conscious only of the

It appears from the above analysis that the active consciousness of putting forth energy is the fundamental constituent of muscle-consciousness; and is that which distinguishes it from special and organic sensation, and distinguishes voluntary action from action of a purely automatic and mechanical kind; and that it is muscle consciousness that brings out most clearly the fact that mind is an active principle, or one which acts and is not merely acted on—a merely passive product. The above account is opposed, therefore, to the automation view of mind, which makes mind to consist wholly of passive sensation, and to be a passive product of the physical machinery of the organism without any reaction of its own on the machinery which produces it, thus making man to be literally a machine.

Some recent psychologists, however, have attempted to explain away the active element in muscle-consciousness; and to prove that muscle-feeling is composed solely of the passive elements of organic and tactile sensation explained above, and nothing more. Thus when I act voluntarily, I have an idea of the action beforehand, and the kind of feeling called desire (viz. to perform the action); and it is this antecedent idea and feeling alone that distinguishes voluntary from reflex and instinctive action. But idea and desire have nothing directly to do with the production of the movement. We find that the movement *follows* our desire and consent, but it does so automatically; we are not really conscious of producing it. The concentration and discharge of energy to contract the muscle fibres and produce the movement, follows and goes on automatically and unconsciously. Consciousness of the action does

not begin until the return-currents come in, reporting the changed state of the organs produced automatically by the unconscious outgoing currents. The so-called consciousness of *activity, innervation*, putting forth of *energy*, is not really such. The so-called consciousness of *effort* is only a consciousness of the effects produced by effort, not of the effort which produces them. Indeed bodily effort and activity do not themselves enter directly into mind at all; they are only something which we infer to have taken place from the changes produced by them. Muscle-consciousness is therefore a consciousness of passive sensation only—of *being acted on*, not of *acting*. All bodily activity is automatic or mechanical. Only the effects produced by it enter into consciousness.

changes produced in the muscles and joints, not conscious of producing them;

Thus, when I walk, or write, or speak, the activities are really performed automatically and unconsciously. What I am really conscious of (apart from the state of desiring or willing preceding), is the effects or changes following the activities, *viz.*, the changes produced by these activities in the limbs and in external things, as reported by sensory nerves. In the interval between the idea of the desired action and the sensations produced by the action, there is nothing mental. Only the idea and consent is mental; the action itself is automatic. So it is with all voluntary actions.

Bodily changes are really mechanical and automatic,

Or if there is such a thing as consciousness of *active effort*, it is not of effort to move the limbs and produce the movement, but only effort to keep my thought fixed on the idea of the movement, and its results—*i. e.*, only effort of attention. When my thought is thus fixed on the future results of the movement present in idea, the movement itself follows automatically. It does not itself enter into consciousness—only its antecedents and results do, *viz.*, (1) the idea and consent before the action is performed, and (2) the passive sensation after it is performed.

There is no such thing as consciousness of controlling the body, which is only a machine working automatically.

The objections to this hypothesis (which some, *e. g.* James think they can prove experimentally, though others think that they are misinterpreting their experiments) are:—

(1) That it seems contrary to the evidence of consciousness itself. For we seem to be clearly conscious of *putting forth energy*, and of *acting* as well as of *being acted on*; and regard the opposition between these two things as the widest opposition within the sphere of consciousness. The sensation theory would reduce this opposition to an illusion.

But this is contrary to the evidence of self-consciousness, and to the principle of relativity.

And the distinction between effort of attention and bodily effort is fallacious. Even effort of attention is effort to overcome resistance, and all resistance comes to us through the medium of the organism—it is resistance of organism to control of will. Therefore consciousness of attention itself involves consciousness of bodily effort and activity (see Attention).

(2) That it is contrary to the principle of relativity. There can be no action without reaction, and no consciousness of being acted on without consciousness of reacting. And consciousness of reacting means consciousness of overcoming the resistance of the organism and making it subservient to our purposes.

(3) That it would render the very distinction between *self* and *not-self* *mind* and *world*, inexplicable. We distinguish ourselves from the world as resisting, or *reacting*. Now if there were no consciousness of the former but only of the latter, the opposition between self and not-self could never have arisen. Indeed, without such opposition and contrast, it is difficult to see how consciousness would be possible at all.

(4) That it is self-contradictory, because the idea and desire of an action is itself the consciousness of an incipient effort to perform the action, and therefore an incipient consciousness of the action itself, and not merely of its future results. And consciousness of being acted on is fundamentally a consciousness of resistance, which is impossible apart from a consciousness of the activity resisted.

The consciousness of volition is itself the consciousness of outgoing energy.

And consciousness of resistance includes consciousness of the energy which is being resisted.

It is not enough to say that conscious effort is effort of attention only because attention is conscious control of organism.

Though the theory of the automatic character of action and of the passivity of all consciousness (see materialism) may be clear and consistent enough in itself, some writers such as James try to avoid the full consequences of this doctrine of automatism by trying to distinguish between effort of attention and bodily effort, and saying that the former is conscious while the latter is not; and, while admitting a mysterious something which they call "a fiat of will, decision, voluntary mandate," yet argue that it applies only to attention, and has nothing to do with conscious control of organism (as if attention itself involved no consciousness of organism and organic effort). "In muscular feeling we are not sensible of the *force* on its way to produce an effect, but only of the effect produced." The obvious answer is that the effort which we are conscious of in voluntary exertion (even though we should call it "persistence of will") is *itself the force on its way*; and we are clearly aware of a connection between the voluntary exertion which produces the movement and the muscle-sensations which are produced by the movement. That consciousness tells us nothing directly about nerves or muscles as they appear outwardly to the eye, is true but not to the point—it includes an inner awareness of them all the same, though it is not until afterwards that we learn the connection between the inward consciousness of effort, and the outwardly visible limbs. Indeed we know that physical expansion is the outward expression of mental effort, and if it be true that every mental process expresses itself in a physical one, then there must be an organic overflow even in sensation, though the consciousness of it is swallowed up in passive feeling, and the overflow (i. e., the activity involved) must be a factor in consciousness.

XIII.

PERCEPTION OF EXTERNAL THINGS.

§ 74.

We have considered the sense-organs and their sensations, and have found that the meaning and use of sensations in the economy of mind is to supply the *means* and *materials* by which we rise to knowledge of external things. The next question therefore is : *How do we come to know the existence of external things and understand their qualities and relations by means of our sensations?* It must evidently be by a process of interpreting or understanding what sensations mean and imply, though the process comes to be performed so rapidly and automatically, that we are not clearly aware of its complex nature, and believe it to be a simple act of cognition. In fact perceiving the external world is like reading a book. The pages and letters of the book are at first only sensations of touch and vision ; but we have learnt to interpret them almost automatically into a world of ideas and knowledge about things. So the external world is presented to us in a series of sensations ; but, though the sensations in themselves are only passing states of our own conscious self, we learn to read in them the existence, attributes and relations of a world of things independent of our self. This intellectual process, then, by which we interpret our sensations so as to know by means of them the existence of external things and their qualities and relations, is *perception* (*external*, as distinguished from the *internal* perception of self and its functions, in self-consciousness).

The word perception is loosely used, however, for several intellectual processes. (1) It is used for cognising the truth of propositions in all different ways, even for knowing mediately or by inference, as, *e. g.*, when we speak of perceiving that such and such an effect must follow from such and such a cause ; (2) it is used for recognising the things which we see, hear, taste or smell, as when we say we perceive that this is a piece of flint, or that, an oak tree ; (3) it is used especially for all kinds of knowing supposed to be immediate (as opposed to inferential), as knowing the existence of self and

The use of sensations is to give knowledge of the external world ;

Which they do through the process of perception.

The word perception used in several meanings.

of external things ; but (4) is often restricted to discerning the existence of *external* things with their qualities and relations.

In psychology it means knowing external things in and through sensations.

In psychology the word perception is commonly used in the last of these senses, *viz.*, to mean *the intellectual process by which, through the medium of our sensations, we come to know and believe in the existence of external things with their attributes and relations*, independent of ourselves and our sensations. It supposes, therefore, that we have sensations in our minds, and that by means of them we know at once the existence and attributes of things outside of our minds—understanding every sensation in our mind to correspond to a thing and quality outside of our mind (though not necessarily outside of all mind).

Though we must distinguish—

It is well to distinguish, however, at the outset two distinct problems involved in perception—*viz.*, *psychological* and *metaphysical*.—

Knowing external things in the properly psychological sense,

(a) The *psychological* and *empirical* problem of perception starts from the fact of experience that, for every sensation in the mind, we form the idea of and belief in a corresponding reality outside of mind, and inquires merely why and how this idea and belief have been formed.

And knowing them in the metaphysical sense.

(b) The *metaphysical* problem of perception goes farther, and inquires whether and how far the idea and belief thus empirically acquired by the mind can be supposed to correspond to actual substantial reality existing external to and independent of our mind ; or what the reality is in itself which gives rise to our idea and belief.

Thus it may be supposed that the ideas which we form of external things in our perceptions, resemble in all respects the external things themselves as pictures and models resemble their objects—which is realism in perception.

Or that they resemble things in some respects but not in all, so that we know directly only some of the qualities of things—which is modified realism in perception.

Or that there is no resemblance of kind at all so that we do not know directly any of the qualities of external things, but know them only symbolically and as powers which give rise to sensations in us (in themselves unknown)—which is phenomenalism or idealism in perception.

And some have even gone so far as to say that there are no things at all external to minds, and that minds are the only realities,—which was the theory of Berkeley.

Thus Hume says : "We may well ask what causes induce us to believe in the existence of body (why we suppose things to have existence distinct from mind—the psychological

question), but 'tis vain to ask whether there be body or not" (the metaphysical question). But this question "whether there be body or not" and what our knowledge of its amounts to, is one that forces itself upon us, in spite of Hume, as soon as we begin to understand that there is something in our sensations that is independent of our own selves and feelings.

Cognition and recognition: But the knowledge of external things, even from an empirical point of view, can be seen to involve two closely related questions: (1) How we come to know and believe that external things *are*, that is, have existence of their own external to us, and independent of the sensations which reveal them to us; and (2) How we know *what* they are, that is, know them to be such and such things, or of such and such classes and kinds. When we experience a sensation, such as a sound, a flash of light, or a smell, we not only know at once *that* an external thing exists in direct relation to our sensibilities, and possessing the attribute of sound, light or smell; but in most cases we also know *what* the thing is, and can say "that is lightning," or "that is time-gun," or "that is a sweet-brier shrub." Thus the knowing of the thing by means of the present sensation evidently includes both a question of *cognition*, *viz.*, how we know that there is a thing outside of us, and a question of *recognition*, *viz.*, how we know *what* thing it is, or what classes of things it belongs to.

These two acts, then, the *cognising* and the *identifying*, *recognising*, *classifying* are always combined in one complex mental process, though the process comes to be performed so rapidly and automatically that it is mistaken for a simple one. And the word *perception* is commonly used to include both; but of the two it is evident that the former is the more primitive and fundamental, (*viz.*, our knowing that there *are* external things), and precedes the other genetically.

Hence in the earlier accounts of perception, such as those of Reid and Hamilton, the question how we know that there *are* external things, is the only question discussed. In some later accounts, however, it seems to be ignored altogether, and the question of perception identified with the question: How do we recognise or identify the things presented to us? (omitting altogether the question: How do we know that there

But knowing
things
through sen-
sations in-
cludes—

Knowing that
the things
exist,

And knowing
what things
they are—

Cognition
and recogni-
tion, or
existential
and recog-
nitive per-
ception;

Though some
treat percep-
tion as if
it consisted
in recogni-
tion only,

To avoid metaphysic.

are things?) This would seem to be from an impression that the *existence* of things is a metaphysical question, which is not to be discussed, but merely postulated in psychology. This is wrong, however, because the fact that we have at least the idea and belief in external things is itself a fact of mental experience; and it is the business of psychology to explain the origin and grounds of this idea and belief. But as the *cognition* of a thing's existence is so uniformly accompanied by the *recognition* of the thing, the two may be regarded as forming factors of the same complex process, and both included under the *knowing of external things*, and therefore under *perception*.

Hence general definition of perception.

Hence we may make the above definition more explicit and define perception as: *the intellectual process by which from present sensations in our own minds, we know the existence of things and qualities and relations of things external to and independent of our minds, and know, by the qualities and relations revealed in our sensations, what things they are—thus both cognising their existence, and recognising their identity or kind.*

Hence we must regard perception as involving (1) *cognition of existence* and (2) *recognition of identity*, and consider the two elements separately. Hence first—

I.

Perception as Cognition of existence.

§ 75.

I.
Problem of existential perception.

In considering perception as cognition of existence of external things and their attributes, the question is: *How do we come to know or believe that there are other things besides ourselves?* We may first consider in a general way the process involved, and then consider the attempts that have been made to explain and define the process more precisely.

1. The process in general.

1. *How do we know that external things exist?*— Considering the perceptual process in a general way, we can see that it is by means of our sensations that we know the existence of things other than ourselves. But our sensations are only states of our own minds. How then can we know from them the existence of things external to our own minds? It can

only be by interpreting and understanding our sensations ; and it is in this interpretation of sensations that external perception consist. We feel that our sensations are not of our own making, and do not rise out of our own will nor anything in ourselves, but force themselves upon us from without, and compel us to adjust ourselves to them ; and are thereby compelled to explain them to ourselves by *thinking of something other than ourselves as their ground* (*i. e.* as present in them and giving rise to them), and *thinking our sensations as manifestations or effects of that external ground* ; and are thus led to believe in the existence of external things having the attributes or powers of occasioning our sensations.

Thus every perception supposes a sensation, and is the passing of thought from the sensation itself (as a merely mental state) to the existence of something other than ourself as its ground or cause. Thus, in or through every sensation, we cognise both the external something, and a power, attribute or quality of that something corresponding to the sensation. And the perception differs from the sensation out of which it springs in this: in perception our consciousness does not confine itself within the sensation (as an agreeable or disagreeable state of our own self), but passes immediately to the things and qualities and relations of things which the sensation reveals, just as if the cognition had nothing to do with the sensation. And the clearer the perception is, the less do we think about the sensation itself as such, and the more about the thing revealed to us in the sensation. (It is to be understood, however, that the full meaning of *externality* has to be gradually learnt along with that of space. What is present to mind at first may be merely the *otherness* or *not-selfness* of sensation. The full meaning of externality and space has to be learnt afterwards.)

The reasons, then, why sensations, and not other states of mind, reveal to us the existence and qualities of external things, are these.—(1) Sensations are not dependent on our own will, but come and go whether we are willing or not. They differ from other states of consciousness in this, that they force themselves into consciousness from outside, interrupting the stream of thought, and in spite of, or without co-operation

Existence of external things revealed in and through sensation.

Every sensation manifests a thing and a quality of that thing

But why do sensations reveal external things ?

Because of their not-selfness—they

are forced upon us from outside,

And are both independent of our own will;

For they compel us to adjust ourselves to them.

And are independent of one another;

And are essentially the same to many minds.

of our will. Other mental states are more or less subject to our will; we carry them about with us wherever we go; but sensations come and go independently. We can, by willing it, change the course of our ideas, and the series of active muscle-feelings, but we can not avoid nor change the taste or smell, the sound, the flash of light, the cold or heat. The colour, outline and sound of the trees, the heat of the sun, the chill moist feeling of the rain, force themselves upon us whether we will or not. These are *in our mind* indeed, but at the same time depend on conditions which are external to our mind.

(2) Thus, with every sensation we have a feeling of resistance, reaction, compulsory self-adjustment. We are compelled to start involuntarily at the loud sound, follow with our eye the moving light, and bend to avoid the flying ball. This adjustment is of our own making indeed, but we feel ourselves forced to make it. This also, therefore, compels us to think of something manifested in the sensation, which is not ourselves.

(3) And from this it follows that there is no relation of dependence or causation between sensations among themselves, and between them and other mental states, such as there is between other mental products among themselves. Sensations are not dependent on one another, nor on other mental states. One idea raises another idea, ideas give rise to emotions, these to desires, and these to volitions. But one sensation cannot of itself cause another sensation. Now to feel that sensations are thus independent of one another and all other contents of consciousness, is equivalent to feeling that, though they are in our mind, they have their ground elsewhere than in our mind. And this is equivalent to saying that they manifest to self the existence of something which is not self.

(4) And, again, we soon find that different minds experience essentially the same sensations under the same circumstances. In the presence of a waterfall, or a battery of artillery at work, sensations of sight and sound are the same to all. But the other mental states—thought, emotion, volition—differ in every mind. This fact, also, carries with it the conviction that there is something in or behind sensation which does not depend on our own nor any individual mind.

Hence we are compelled to think of a ground of sensation which is not in any finite mind, and compelled to abstract the idea of this ground from our own and all finite minds like our own, and think of it as having existence of its own, independent of our and other finite minds, *i. e.*, as an external world.

Thus it is the contrast between sensations and other states of consciousness that forces upon the understanding self the distinction and contrast between *its own activity* as manifested by itself in its own voluntary states, and an activity *which is not its own* manifested in its sensations. And as it is conscious of *itself* as the subject and ground of the one kind of activity, so it is compelled to think of something which is *not itself*, as ground of the other. And as it is aware of itself as a permanent reality or substance, and of its voluntary activities and states as powers, functions, attributes of itself; so it is compelled to think of the not-self as reality or substance, manifesting its powers and attributes to it by occasioning sensations in it.

It thinks, in fact, in this way: As my own voluntary activities and states are to myself, so the activity manifested in my sensations are to something which is not myself. And external perception consists properly in supplying this *fourth term* of the proportion *viz.*, the existence of the not-self, as the substantial ground of which the sensations are manifestations. And as our sensations with their qualities, degrees and relations become more fully discriminated, so our conception of the external world with its constituent things, qualities and relations, becomes fuller and more adequate, by continuous discrimination and interpretation of sensations.

Hence also, as ideas and feelings, directly subject to the control of will, are felt to belong to the self, or to be *subjective*; so sensations, being to certain extent independent of the self, are regarded as in some way *objective*, or belonging to the external world. Hence perception is sometimes described as consisting* in objectifying and localising *sensation* *i.e.*, *thinking them as qualities, or as manifestations and works of qualities existing objectively in things, situated in particular places outside of ourselves*. For this habit of objectifying goes so far that in some cases we forget that our sensations are sensations, and think of them as actual qualities inherent in objective things, as pain in the finger, colour in the rainbow, greenness in the leaf, heat in the fire, light in the sun. This habit is corrected, partly at least, by reflection, and we come to understand sensations as such as really states of your own minds, and as merely manifesting the qualities (*i.e.*, powers) of the things which occasion them; and to think of them, not as themselves *objective qualities* of external substance, but as *mental effects*

Hence contrast between what we produce by our own will and what is forced upon us from the outside.

And hence distinction of subjective and objective,

And presence of objective element in all sensations,

of its qualities—to think that the sensations as *such*, the heat or cold, taste or smell, are but states of our own consciousness; and that that in them which is not ourselves, is merely the power of energy which is present to us in them, and imposes them on us.

Hence as self is the reality underlying our free activities, so there must be another reality underlying sensations.

It appears, then, that perception is an application to sensations of the idea of *substance and attribute* (which involves again that of cause and effect). We are *directly* aware of self as a reality, or substance manifesting itself in certain functions (for we could not get the idea of permanence under change from any other quarter); and are compelled to think of a *not-self* which is also a reality, manifesting itself to us in or through the sensations which it occasions in us.

Every sensation, therefore, which is clearly apprehended as a sensation (*i.e.*, as a state of consciousness forcing itself into the series of conscious states without the conscious co-operation of self), necessarily entails an act of perception. And this is fundamentally nothing more than the *self's cognition of the element of not-selfness* contained in such a state of self *viz.*, the element of compulsion or constraint, revealing the existence of a power distinct from and opposed to our own.

§ 76.

2. The process of existential perception further described.

Is it intuition or inference?

2. *Is cognition of external existence immediate or mediate, intuition or inference?*—So much for perception in general. If we attempt to go beyond this, and to determine the nature of the perceptual process more precisely, we find ourselves on the field of an old controversy in the course of which various theories have been propounded. The controversy has turned mainly round the question, whether the perception of the external world is *immediate* or *mediate* knowledge, *intuitive* or *inferential*—whether we are immediately *conscious* of external reality, or merely *infer* its existence. Can we say that we are *directly* conscious of external things with their essential attributes in the same sense that we are directly conscious of our self with its states and processes? Or is it the case that self and its states are the only objects of *immediate cognition*, and that external things come to be known only because they are *implied* in some way in certain of the states of our own self (*viz.*, sensations), and can be *inferred* from them as we infer the existence of causes when we see their effects? Thus—

(1) *The theory that the cognition of external reality is immediate.*—Some have maintained that we are *immediately* and *intuitively* conscious of external reality at the same time and in the same sense in which we are conscious of ourselves as thinking mind.

Theory of an intuitive perception of the external world.

Thus Hamilton affirms that "the ego and non-ego are given in one original antithesis. We are immediately conscious in perception of an ego and a non-ego, known together and known in contrast with each other. I am conscious of both existences in the same indivisible moment of intuition. Consciousness gives, as an ultimate fact, a primitive duality—a knowledge of the ego in relation and mutual contrast with a non-ego, and of the non-ego in relation and contrast to the ego." And this seems to be required by the principle of relativity. Indeed it is difficult to understand how we should ever have come to think of things other than ourselves if we were not directly conscious of their existence in the very act of being conscious of our own existence.

Not-self, known merely as a power which limits the self.

This statement, indeed, taken by itself claims nothing more than an immediate consciousness of a not-self as a contrary *energy* resisting and limiting the energy of self. But Hamilton and other realists in perception are not satisfied with an intuitive perception of not-self as energy merely; they affirm that we are immediately aware of not-self as something having the attribute of extension, i.e. of occupying and resisting motion through space, and therefore as a *material* world. In other words, in being conscious of self as something having the attribute of feeling, thinking, and willing which makes it to be *mental* reality, we are conscious at the same time of not-self as something having the attribute of being extended in space, which makes it to be *material* reality. This, then, is the theory of an intuitive or immediate perception of the world as *material*. Hamilton claims that it is self-evident to unsophisticated minds (to common sense), and therefore calls it 'natural realism'. It is evident, however, that we may be conscious of an external reality limiting and resisting ourselves, without being directly conscious of it as extended and material.

But some go so far as to say that we are immediately conscious of the not-self as extended and impenetrable reality, which is popular realism.

(2) *The theory that cognition of external reality is an inference.*—Others think, however, that the cognition of self and that of not-self cannot be simultaneous and on the same level. The perception of the reality of self must precede that of not-self, and be logically independent of it. External things are not present in consciousness in the same sense as the self which has the consciousness, but are only implied

Theory of a mediate perception of the external world—perception as inference:

in it. "That which is felt is *in* the sensitive subject, and that which is thought is *in* in the thinker." And "the soul has no windows" nor doors through which external things can enter into it to make themselves felt directly. Therefore nothing outside of mind can be an *immediate* object of consciousness. I can be immediately conscious of what I am and what I do, but cannot be immediately conscious of what I am not, *i.e.* of things other than myself.

Sensations are states of our mind; but we do not make them ourselves; therefore there must be external things which cause them.

It follows that we can know what is external to mind only *mediately i.e. by inference*. And the inference is drawn in this way: nothing, it is assumed, can be directly present to mind except what is contained *in* mind, *i.e.* its own sensations, feelings and ideas. But sensations, though *in* mind, arise and pass across the field of consciousness without any co-operation of our will, and sometimes in spite of it. They must therefore have a *cause* lying outside of ourselves. Hence from sensations inside our minds, we must *infer* the existence of things outside as the causes of our sensations, with qualities corresponding to the sensations which they cause. Perception, therefore, is essentially an *inference from effect to cause*. From the representations of things which form themselves in our minds, we infer the existence of the things represented.

Hence perception is an inference from effect to cause.

Thus when a screen is suspended before us, and we are aware of shadows moving about on the screen, we infer from the shadows, with their forms and movements, the existence of corresponding things behind the screen. So it is in external perception. The sensations in our mind are the shadows on the screen, and from these we infer the existence of things outside our minds, having the same forms and movements.

Difficulty of the inferential theory.

The truth seems to be that both the above accounts—that of immediate and that of inferential perception—are true in part, but both assume too much. The perception of an external not-self as limiting and resisting self must be an *immediate* intuition. But on the other hand the knowledge of the not-self as a material reality, extended in space, involves elements of *inference* and construction, and has to be acquired gradually. Thus (a) against the theory of perception of not-self by inference: it cannot be the case that we depend on inference for our knowledge that something other than ourselves exists. It follows from the law of relativity that in being aware of self we must be in some sense aware of not-self as its correlative, at the same time.

and in the same act of cognition. Even Kant admits that we are as sure of the not-self as of self. Thus far Hamilton must be right. And further we could not infer the existence of things as the *causes* of our sensations without having previously obtained the idea and understanding of causality. But it is just from this consciousness of things as giving rise to our sensations, that we get this understanding. Therefore our knowledge of the existence of external things must be antecedent to all inference from effect to cause. We must be in this case directly *conscious* of the causal relation, instead of merely inferring it. (b) And against popular realism in perception, or immediate consciousness of not-self as *matter*: it cannot be the case that we are immediately conscious of the not-self as matter in the same sense in which we are conscious of self as mind. This would imply that we are immediately conscious of extension in space (that which makes matter to be matter)—of distance, magnitude, solidity, direction, and the like. But this is impossible, as it would imply that these attributes are attributes of our own self—that our self is extended, etc. They are really complex ideas which have to be built up gradually, involving memory and inference, and cannot be primitive intuitions.

Difficulty of the intuitive theory.

Result, modified realism.—What conclusion, then, must we come to regarding the nature of the perceptual process by which we form our idea of not-self and external world?

We must admit with Hamilton that knowing self and knowing not-self, self-consciousness and other-consciousness, internal and external perception, are inseparable correlatives; that in being conscious of self we are conscious of the existence of not-self at the same moment and in the same indivisible act of cognition, because we cannot know either except in contrast with the other; that knowing self and knowing not-self are not separate acts of cognition, the one being intuitive and the other inferential, but are two factors of one and the same intuition of existence. But we must at the same time admit that knowing the nature of the not-self as a *material* world requires experience and inference.

Truth underlying the intuitive theory—in knowing self we must know not-self as correlative, and therefore immediately.

But we must grant at the same time (i) that the consciousness of self and that of not-self, though intuitive and correlative differ in kind. Both are consciousness of energy. But the one is consciousness of energy which is ourselves; the other, of energy which is not ourselves. Therefore the one is *positive*; the other is, in a sense, *negative secondary indirect* (though not in the sense of inferential). The one is consciousness of the

But the cognition of not-self is second-

ary and negative

And it reveals the not-self directly only as a power limiting our own power, and occasioning sensations in us.

Our perception of the other attributes of the not-self involves representation and inference.

contents of our own individual being ; the other, of its limits—the one, of what we are ; the other, of what we are not. And we must grant (*ii*) that this primitive intuition does not tell us anything about the nature of the not-self, beyond the fact that it exists as an energy resisting and limiting that energy which we are conscious of as constituting the essence of ourselves. The mere fact that sensations are imposed upon us, tells us nothing beyond the existence of a not-self having the power of imposing them. Our conception of this not-self as a *material* world of things in space and time, has to be built up by interpretation of the different kinds and degrees, qualities and quantities, of sensation. Our conception of the material world as material, is a subsequent *construction of our own*, and involves representation and inference.

We conclude then that perception, in so far as it is concerned merely in revealing to us the *existence of substantial reality external to ourselves* is simple and immediate cognition. But that more complex kind of perception which consists in cognizing the extension, magnitude and position of things in space, and thereby recognising them as material things, and understanding the not-self as a *material* world involves memory and inference, and is therefore complex, mediate, acquired. In other words, we must conclude that the *cognition* of not-self or external reality is *immediate*, but that *recognition* is *mediate and inferential*. Hence—

II.

Perception as Recognition.

§ 77.

II
The process of recognitive perception.

In cognising the existence of things we *recognise* them for what they are. In mature life, at least, there is probably no cognition of existence without some recognition of what existence it is, *i.e.*, some assimilation of the thing to other things perceived before, and thereby some recognition or classification of the things perceived. When we hear a sound we perceive not only that there is a sounding thing somewhere, but also that the sounding thing is a bell, or a bird, or a gun, *i.e.* we recognise it. We may distinguish therefore between *existential* perception—perceiving that something exists ; and *recognitive* perception—perceiving what it is.

For every sensation, we have found, reveals a quality of a thing. But (after the very beginning of conscious life) sensations are never absolutely new. It may be said of almost every quality of a thing and of most sets of qualities, that we have experienced it or them somewhere before, in previous acts of perception. Hence, when experienced again, they are *felt* to be the same as have been experienced before; and the thing is thereby recognised as identical with, or as of the same kind or class of things, as some thing experienced before—viz., as giving the same sensations, and therefore having the same qualities. Thus, when I experience a particular colour, or sound, or smell, I am usually able to say not merely 'that is a yellow thing,' or 'a sounding thing,' or 'a fragrant thing,' but also that it is 'an orange,' or the 'time-gum' or 'a sweet-brier shrub,' expressing the fact that I not only *cognise* the existence of the thing but also *recognise* what thing it is. Hence my perception may be said to include both the *cognition* and the *recognition* of the thing, because the two have come to be inseparable constituents of one mental process.

How then is the recognitive function of perception accomplished? The process of recognition when analysed will be found to involve *representation* (memory) and *inference*. Thus the fact that a present sensation and thing perceived can be recognized as identical with a previous one, implies that past experiences can be in some way retained, and reproduced or represented in the present. And this, again, is explained by supposing (*i*) that every experience makes some permanent impression on the system, and thereby leaves some *trace* of itself, which remains in the system even after it has sunk out of consciousness; hence when the *same* sensation or thing, **A**, has been experienced several times in succession, its traces, a_1 , a_2 , a_3 , etc., being identical in kind, amalgamate and strengthen one another (by assimilation), so as to be permanently impressed on the system. Hence when we meet with **A** again, it revives and absorbs into itself the old traces of its own self *viz.*, a_1 , a_2 , a_3 , etc.; and this amalgamation of the past with the present gives the feeling of recognition—we feel that **A** is identical with what we have experienced before.

And further (*ii*) when several *different* sensations are experienced together or in close succession so as to form one whole of experience, the traces which they leave are also connected together in the system (by association) so as to make one whole of thought; whence, when any one is roused into activity again, it rouses the others along with it. Thus **A**

In perceiving that an external thing exists, we always perceive what thing it is, i. e. we recognize it.

But such recognition is a complex process, supposing

That a percept revives traces of its own former self by assimilation,

And traces of associated perceptions by colligation.

Making the present percept to be a 'presentative representative complex,

Which is inferred to correspond to something which has been and may be experienced.

Recognition therefore involves memory and inference.

Hence while existential perception is immediate,

Recognitive perception is immediate.

Thus the perception of the external world is a

(e.g. the colour and form of a fruit) has been so often experienced before in connection with *BCD* (its touch, taste, smell) that when *A* is presented to us again, it brings up the ideas *bcd* along with it in thought, as parts of the same whole. Thus there is brought before our minds the complex image *Abcd*, an image of a thing having a certain colour, form, touch, taste and smell, *A* being *present* in sensation, and *bcd* *represented* in memory.

(iii) Finally, we infer automatically that the thing directly presented in the sensation *A* (viz. as a round yellow thing) possesses also the attributes *BCD* (a certain touch, taste and smell), though these are now before us only in representation; and that it is therefore the same thing, of the same kind as what I have experienced before. In other words, we not only recognise the thing as existent (*existential* perception), but recognise what thing or class of thing it is (*recognitive* perception). Hence

Representative elements.—Thus we can see that *recognitive* perception is existential perception supplemented with *memory* and *inference*. The present sensation gives the existence of an external *something* corresponding to the sensation, and nothing more. But it revives the other sensations in representation, and we at once infer that the thing which gives me the sensation *A* is capable of giving me also the sensations represented by the ideas *bcd*, and is therefore the same as the thing or things which gave them to me before.

Thus in *recognitive* perception the *intuitive* and *inferential* theories of perception both hold good—the one is true of recognition of the thing's existence as a reality outside of ourselves, and the other of our recognition of its identity or class. We are directly *conscious* that there is a something not ourself occasioning such and such a sensation in us; and we *infer* that the same thing is capable of occasioning certain other sensations in us, and is therefore identical or of the same class with other things which have done so before. Still this complicate process of cognition and recognition passes through the mind so rapidly and automatically that we are not clearly aware of memory and inference being concerned in it at all, and suppose that the whole concrete thing is presented to consciousness at once.

Thus, when I hear a particular sound and say 'that is the 1 o'clock gun,' the complex perception includes (1) the *sensation* of sound, and *simple cognition* that there is an external

thing having the power to cause it, expressed by saying "that is a sounding something," and (2) the *recognition*, or feeling that we have heard the same before, and (3) the *inference*, which would be fully expressed by saying "that sounding object is a metallic tube of peculiar shape and size, mounted on the parapet of the fort, two miles away, charged with gun-powder, and fired off with the sound which I hear, at 1 o'clock every day, and called a gun." These latter facts however are brought before my mind only in *representation* or idea; the sound brings up before my mind's eye a faint picture of the parapet, the metal tube, and the small cloud of smoke, though I do not see them with my physical eyes. But these ideas combine in one whole of thought with the present sensation, and the whole aggregate of presented sensations and revived ideas (represented sensations) gives the conviction that there is an external thing with qualities corresponding to these sensations and ideas; and this complex of sensation, idea and belief, with the feeling of the nascent self-adjustment which it necessitates, is the *percept*.

Hence the essence of external things.—It follows, therefore, from the way in which we perceive things that the essence of things consists in energy or power of preserving themselves by resisting and producing changes in other things. And the different forms in which this energy manifests itself, its different powers of producing effects, are what we understand by its qualities; and its different qualities taken together constitute its nature or what distinguishes it from other things; and those qualities of things which are known to us, are those which give rise to sensations in our minds. Hence, having considered how sensations reveal the existence of the not-self, we have to consider how they reveal the qualities or nature of the not-self. And in so doing we shall meet with those qualities which distinguish the external not-self directly revealed in perception from the self which perceives them, and make the not-self appear to us as a material world.

complex process including presentative and representative elements.

The percept.

How then do we come to think of the external not-self as a material world?

XIV.

THE EXTERNAL WORLD AS MATERIAL : NOT-SELF AS MATTER.

§ 78.

Perception reveals the existence of things having such and such qualities. A thing's qualities are its powers of producing effects upon other things; and, in the case of sensitive beings, the effects produced on them include sensations. *Every sensation, therefore, reveals the existence of an external thing having a certain quality which is manifested in that sensation*, e. g., the sensation of light reveals some luminous thing, greenness some green thing, and so on. And our direct knowledge of the qualities of external things is co-extensive with the range of our sensations and the perceptions rising out of them.

Thus our conception or knowledge of a thing is arrived at by putting together the results of many sense-perceptions. Each perception gives a quality of the thing, and by associating these qualities together in our minds we form an adequate conception of the thing, as something existing independently of ourselves, and permanently manifesting these qualities, i. e. exercising these powers.

Hence in thinking an object of perception we think it as consisting of two correlative factors :—

Hence a thing is outwardly a cluster of qualities,

(a) *As an aggregate of qualities or powers*, which we think in terms of the sensations which they give us. Thus we think of the fruit as an aggregate of powers which affect our tactful and muscular sensibilities, and those of colour, taste and smell; and which we represent to ourselves, therefore, in terms of these sensations (though we know that the sensations are only in our own minds, while the qualities are in the thing). But the qualities considered apart from anything to support and hold them together are only abstractions; therefore we have to think the thing also—

And inwardly an entity which preserves and manifests it self in and

(b) *As a reality or substance*, i. e. as something in which these powers or qualities inhere, and which gives them their connection, unity and permanence, and which preserves and manifests its own existence by means of them; so that making these powers to be always present together,

producing the effects on other things, and (along with their other effects) occasioning sensations in sensitive minds within their range.

Thus by substance or reality we mean something which possesses existence, and power of preserving its existence ; and its power of preserving its existence means its power of reacting on and resisting other things ; and the different effects which it produces in other things are different applications of this fundamental power of resistance by which the thing preserves itself ; and these powers of producing effects (really different applications of one power) are what appear to us as the qualities of the thing.

Thus quality is nothing without substance, and substance nothing without quality. The two together constitute the concrete *reality*. And the notion of substance as what gives order and unity to a system of activities or qualities would appear to be derived from our consciousness of our own self as the unity of thinking, feeling and willing. We are not directly conscious of such a permanent unity and *center of power* anywhere else.

The psychology of perception has to explain, therefore, not only *how we come to know the existence of external things as realities in this sense*, but also *how we come to know and represent the different powers or qualities inherent in external things*. We have considered the first question, and also the second in a general way. But some of the qualities of the not-self require special consideration, because some of the fundamental problems of metaphysic and philosophy turn on the question, how we know these qualities, and what we know about them. This applies especially to those qualities which differentiate matter from mind, and make the *external* world, which we are conscious of in perception, to be a *material* world ; in other words, those qualities or powers which make matter to be matter (as power of self-consciousness makes mind to be mind). To prepare the way for this, we have to make a provisional classification of all the qualities which the external world presents to the thinking self.

After that, we shall have to inquire especially, how an understanding of the fundamental qualities is acquired by perceptions of the different senses.

through these powers.

Substance is what preserves its own existence by exercising power, and power manifests itself in qualities

Hence we perceive things as they manifest themselves in their qualities or powers,

And we are conscious of these in our sensations.

§ 79. What is Matter? Its Qualities: Primary and Secondary.

We commonly say that the *nature* of matter differs from that of mind. But the nature of a thing means its essential qualities.

But the qualities of external

things appear to us as being of two kinds—

Essential and non-essential, or

Primary and secondary.

I.
Certain qualities are essential to the very existence of external things.

Certain qualities present them-

i.e., those which differentiate it from other things. What then are the primary or differentiating qualities of matter?

Now it occurred even to early thinkers that the qualities which we ascribe to the external world are of two kinds, so different that the one kind may be described as essential and primary, and the other as non-essential and secondary.

For some of the qualities which in perception we ascribe to things have to be thought of as universally present in the things and as always essentially the same, and as constituting the *essence* of the things (in the sense that in them the substance of the things *expresses* or *manifests* the essential nature which distinguishes it from other substances); so that without them the things either would not be things at all, or would be things of an entirely different kind. These, therefore, appear the same to all minds universally. Others, again, can be thought of as present or absent, and may appear different to different minds, and are such that one may be substituted for another without altering the essential nature of the things. The former class of qualities may be called *primary* or *essential*, because without them the thing would not be a thing in the same sense; while the latter may be called *secondary* or *non-essential*, because the things may have them or be without them, and yet remain essentially the same in kind. Thus

I. As to *primary qualities*: we find by experience that the external things which are the grounds of our sensations, manifest themselves to us always as filling certain areas or extents of space, or as being *extended*, (i.e., as having the attribute of *extension*) : and as resisting motion through the portions of space occupied by them, (i.e., as being *impenetrable*) ; and as made up of parts, each occupying and resisting motion through certain portion of space, (i.e., as being *divisible*). And we find by invariable experience that, wherever there are objects capable of occasioning sensations in us, they compel us to think of them as having these attributes of *extension*, *impenetrability*, and *divisibility*. In other words, the very nature of external experience compels us to think of the things as having these qualities (which is the psychological side of the problem).

But we do not stop with merely *conceiving* the things as having these qualities. We believe that these qualities are

actually inherent in the things as their essential nature, and combine them in our minds into *one complete idea of what is essential and common* to all those external things which we think of as the grounds of our sensations ; and fix that idea in our minds by applying the term *materiality* to it, as being the idea of what makes matter to be matter. And because the not-self directly manifests itself to us in external perception only under this fundamental appearance of materiality (occupying, and resisting motion through space), we speak of the things externally revealed as *material*, and as constituting a *material world*. And we do not ask the question how, but commonly take for granted that, this conception within our minds corresponds to the independent reality outside of our minds (which is the metaphysical side of the problem). And it is by such psychological processes that we form our conception of the external world.

Hence if we believe in the objective and metaphysical reality of primary qualities as realists do, we may define them more succinctly in this way : the *primary qualities* will be those which are essential to the existence of material things as such, and therefore will not only be in the sensations which they give us and the ideas which we form of them, but will actually be *in* the things objectively (considered as extra-mental things independent of our sensations and ideas). Thus, in so far as primary qualities are concerned, the percepts and images of our minds will be exact copies of things outside of our minds (as a photograph is of its object). This will be the case at least with extension and impenetrability in their various modes. This will be realism in perception.

Hence *different forms of the primary qualities*.—We think of extension and impenetrability as the *primary qualities* of matter ; or those which make the external world to be material, and distinguish it from any other reality that may not be material. These fundamental attributes themselves, again, appear under different modes or aspects, and these modes also are spoken of as different primary qualities. Thus—

(a) External things manifest themselves as *impenetrable*, excluding one another from the portions of space in which they are extended ; but impenetrability appears in their forms of *hardness* or *resistance*, power of excluding other things from space of a certain figure and magnitude ; their *inertia*, or power of remaining immovable in a certain position

selves to experience as essential to our conception of the objects perceived,

So that we cannot form any mental picture of the things without these attributes ;

And also as essential to the existence of the things and actually in things as well as in our ideas of them.

And extension and impenetrability—appear under different modes ;

Modes of impenetrability giving the dynamical qualities;

in space ; and their *momentum* and *weight*, or power and tendency to change the positions of other things in space.

Being modes of energy, perceived as working under the form of space,

As distinguished from mental energy, which does not work under the form of space ;

And modes of extension giving the statical qualities of things.

All these, it can be seen, are at the same time modes of energy—as resistance or as movement—and may be called the *dynamical* attributes of body. And material substance has to be thought as a reality which manifests itself by exercising energy in the different ways of moving through, and occupying and resisting movement through space—energy thus manifested being called *physical force*, to distinguish it from other possible forms of energy, such as that of thought. (Whence *energy*, literally *working from within*, which is ultimately the tendency of all substance to self-preservation or self-assertion, may be regarded as the essence or fundamental quality of all substance or reality alike, mental as well as material ; while energy manifesting itself in the occupation of, and change of position in space—*impenetrability* and *extension* in their different forms—must be regarded as the distinguishing characteristics of *material substance*). And

(b) External things manifest themselves as *extended* in space, but their extension may be regarded under different aspects. Extension itself contains within it the correlative aspects of *linear*, *superficial* and *solid*. And concrete extended things further manifest themselves as *divisible* into parts ; as possessing a certain *magnitude*, i.e., filling a certain amount of space ; as having a certain *figure*, i.e., as bounded by lines having certain directions ; as lying at a certain *distance* and in a certain *direction* from one another in space, i.e., as having *position*. These aspects of extension may be called the *geometrical* or *statical* attributes of things, being their relations to space and to one another in space.

Still it must be borne in mind that even these primary qualities are known only by the ways in which they manifest themselves to us through our capacities of sensibility, and that we can represent them only in terms of our subjective affections, i.e., the sensations which they give rise to, and the efforts of self-adjustment which they necessitate.

II.
Other qualities present themselves as variable and non-essential, such as colour, taste, temperature.

II. As to *secondary qualities* : we find by experience that there are other qualities which are not essential to the conception of material things in the above sense, but may be present or absent and may differ not only in different things, but in the same thing at different times. The cloud may be white, black, or red at different moments, and yet be the same cloud. One flower is red and another blue by daylight, but both are colour-

less in the dark, and to a colour-blind observer. The same leaf is at one time green, and at another time yellow; and even at the same time the same thing may be red to one person and green to another. Water is cold or hot, liquid or solid, and so on. Yet in all these changes the fundamental qualities of impenetrability and extension remain the same. The above variable qualities, therefore, may be called secondary, and to this class belong the different colours, sounds, tastes, smells, and temperatures of things.

Hence *secondary* qualities such as colour, taste, smell, sound, temperature, will be only states of our consciousness, which cannot possibly have any resemblance of kind to anything outside the consciousness. They are occasioned, indeed, by powers or qualities inherent in things, and therefore *correspond* in some sense to these inherent qualities, but it is only indirectly, and can no more resemble these objective qualities than the sounds of a speaker's voice resemble the ideas which they express. We learn indeed to objectify and localise them in the things that occasion them, (*i.e.*, think of them as qualities seated in objective things, as we think of greenness as in the grass and cold in the ice), but this is only by a habit of the imagination.

Thus, in the real world independent of our minds, there are extension, plurality, motion, and impact, indeed; but everything goes on in silence and darkness — there is no colour, sound, taste, smell or temperature in the world outside of mind. These are only feelings, and possible only in mind which feels them.

Still, though it is mind that makes these qualities, it makes them by its necessary reaction against influences from without, and is therefore constrained to make them. They reveal therefore not only the existence of things, but also powers (qualities) of the things which occasion them. Hence the terms colour, sound, taste, smell, temperature, may be used in both a subjective and an objective sense — for the conscious states, and for that in external things which occasions the states. What is it then in things that occasions them? To what in things do they correspond? About this they themselves tell us nothing directly, because they are only feelings of mind, and resemble nothing in things. But we may infer that they are occasioned by the different modes and forms assumed by the

And are only states of our own minds, and have no resemblance to any quality of things.

Yet these latter are occasioned by qualities of things, and correspond to them though they do not resemble them;

And there are not meaningless.

primary qualities, *i.e.*, by different arrangements and movements of atoms and molecules, waves of atmosphere and other chemical disintegrations, etc. But this is inference, not perception. Sensations as such have nothing in common with vibrating or disintegrating molecules.

This distinction is the beginning of metaphysic, which distinguishes between the reality of things and their appearances.

One can now understand the philosophical significance of the distinction. It marks the beginning of metaphysical thought. As soon as we begin to understand that things as they really exist must differ from our mental representations of them, we begin to think metaphysically. For we are constrained to inquire how much of our idea of the material world is secondary and subjective only (*i.e.* only in our consciousness) and how much is primary and objective (*i.e.* outside and independent of our consciousness); and hence the various hypothesis of realism, idealism, and scepticism. Hence we can now see—

§. 80.

Hence psychology of perception has to explain how we form our conception of the primary qualities especially,

How we come to understand the material world as such.—The chief thing that psychology of perception will have to do (after explaining how we attain our belief in the *existence* of external things and qualities) will be to explain how we arrive at our understanding of the *different qualities of external things* by which we know them to constitute a *material world*. And under this head, the chief problem will be to determine how, and by which of the senses, we attain an understanding of *primary qualities*, which make matter to be matter.

On which our knowledge of matter depends.

For all the senses and channels of perception, in the sense that every sensation reveals the existence of something external to self as its ground or cause. Yet it is only *some* sensations that lead to a clear understanding of the primary qualities of the external reality implied in sensation—*i.e.* of the not-self as *impenetrable* and *extended substance*, and therefore as a *material world*. Now impenetrability and its different modes are manifestations of energy under the forms of producing and resisting movement. And extension is a manifestation of energy in the power of resisting movement through particular portions of space (which is what we mean by occupying space). Hence impenetrability and extension can be *clearly* perceived only through those organs by which we ourselves exercise energy in the forms of resistance and movement.

Through what faculties then can such knowledge be obtained, and why?

It follows from this, then, that a clear understanding of external reality as *matter* (*i. e.* as substance manifesting the properties of moving and resisting motion through *space*) can be arrived at only through those senses in which passive sensation or affection (*sensation* properly so called) is clearly combined with *dynamical consciousness*, or *consciousness of energy in the form of movement and resistance to movement*, (*i. e.* of physical or muscular energy). In short it can be arrived at only by *those senses which involve muscular feeling of movement and resistance*.

Now we have found that *touch* and *vision* are both accompanied by muscular work, and muscle-feeling. These, therefore, will be the main channels of external perception. They alone will give the primary qualities of matter. The others will give directly only secondary ones ; and primary ones only indirectly, or by inference from the presence of secondary ones.

This inquiry into our cognition of the attributes of the external world will have to pass through two stages : (a) how we directly perceive the primary and secondary attributes of external things, and extend our ideas of them by putting together the result of different perception ; and (b) how we know these qualities to be present in things even when we do not directly perceive them. The former is an inquiry into the *direct* or *intuitive* perception of the attributes of things—showing how far we directly see or feel them to be present. The latter will be an inquiry into the *indirect*, *mediate* or *inferential* perception of them—showing how we *acquire* the power of cognising the attributes of things when they are not present to direct perception, e. g. how we cognise the distance, sizes, shapes and weights of things without handling or measuring them directly. Indeed there has been much controversy as to how much of our perception is of the *direct*, and how much of the *indirect* kind—how much we are directly conscious of regarding things, and how much we merely *infer*.

We may deal with these two phases of Perception therefore under the heads of Direct and Indirect (or Acquired) Perception.

It must be through touch and vision.

And the presence of attributes is perceived.

Directly,

And indirectly.

XV.

HOW WE PERCIEVE THE ATTRIBUTES OF THE EXTERNAL WORLD : (1) DIRECTLY.

§ 81.

Ideas of primary qualities attained by putting together elements given directly by active touch,

And 1 : vision,

and associating them together.

Those of secondary qualities given more or less by all the senses.

We have to consider then the constituents of active touch, giving—

Having distinguished and classified the different attributes of the external world, we have next to consider how the understanding of these is attained by *perception of the different senses*; and more specially, how the primary and fundamental ones come to be understood, which make the external world to be material. Now we shall find (1) that the primary ones (or their elements) are perceived and understood mainly by the combination of muscle-feeling with touch, or by what we may call *tactuo-muscular* experience (active touch), and shall therefore have to consider this class of experiences especially, and the perceptions which they give. But (2) we shall find that certain primary attributes are given also by the muscle-sensations of the eye (*viz.* extension in two dimensions), and shall have to consider how this is done. And (3) we shall have to show how the results of tactuo-muscular and visual perception are combined by association, so as to perfect our understanding of the primary qualities of matter. And finally we have (4) to consider how secondary qualities are given by passive muscle-feeling and touch, by optical sensations of the eye, and by the other sensations—hearing, smell, taste, and organic sensibility; and (5) how secondary ones become associated in idea with primary ones, and thereby built up and complete our conception of matter and the material world.

§ 82.

Tactuo-muscular Perception of Qualities.

By this we mean perception arising from the use of the limbs, and therefore from muscular feelings combined with touch (wherever the limbs come into contact with resisting thing). It will therefore include perceptions derived from the combination of (i) the muscle-consciousness proper (including, we have found, the *active* muscle-consciousness of putting forth

effort, or of expended energy by out-carrying nerves, and the passive muscle-feelings or sensations resulting from the changing states of muscle-fibres, tendous and joints, caused by movement and reported by in-carrying nerves), with (ii) the *passive* sensations of touch themselves, wherever there is contact. For these combined experiences give us the elements out of which our ideas of the primary qualities of matter are built up. Thus—

83.

Impenetrability of things perceived.

I. The understanding of *impenetrability* and *impenetrable substance* may be explained in this way :—

The exercise of muscular energy by outgoing nerves is followed at different times by two kinds of muscular consciousness—sometimes by the feeling of unimpeded energy and free movement, and sometimes by the feeling of being resisted or of impeded energy, and these by contrast give the idea of something impenetrable.—

I. The percep- tion of ex- ternal sub- stance as im- penetrable, viz.

1. In the case of *resisted* movement—the active consciousness of volition and effort, and the *passive* muscle-sensations resulting from the tension of muscles and joints, are both *continuous and intense*, and are accompanied by *tactual* sensation of pressure, and by increase of circulation, and evolution of *heat* in the limbs, and are soon followed by *organic* feelings of fatigue and exhaustion: and all this, without being followed by any relaxation or change, either in the degree of voluntary effort, or in the tension of muscles and joints—as when I try to force open a closed door or to roll a heavy stone. These different experiences make up together what we call the feeling of *dead strain*, *impeded energy*, or *resistance*, as in pushing, repelling, or lifting.

By contrast
between the
sensations of
resisted
movement.

2. In the case of *free movement*—the expenditure of effort may be little more than perceptible, the feeling of resistance and tactile pressure is absent or reduced to a minimum (e. g. the resistance of the atmosphere), and the passive sensation arising from the tension of the muscles and joints is less and different in kind, and undergoes continual variation rising from the alternate relaxation of one set of muscles and contractions of another, as in moving the hand backwards and

And those
of free move-
ment,

Bringing out the contrast between filled and empty space.

And thereby impenetrability in different forms and degrees,

And hence the idea of a material world.

II.
The perception of external substance as extended in space—

By putting together ideas of possible movements, resistances, and co-existence of resisting parts.

forwards in empty space ; and the result is agreeable exhilaration of all the organic processes, rather than fatigue. In this case, then, we have the feeling of activity in the form of *free unimpeded movements*.

Now the above two kinds of experience are strongly contrasted with each other, and by their contrast give rise to two opposite ideas regarding the external not-self which makes these opposite experiences possible. In the former case, we are compelled to think of something external, having the attribute of *resisting our movement*, and giving us the above peculiar feeling of *being resisted* ; in the latter case, of some external condition making free movement *possible*. Hence, by combining the idea of resistance with that of free movement in space, we arrive at the idea of a resisting something which is at the same time extended in space (*i. e.* occupies and resists movement through a certain extent of space) ; and this something combining resistance with extension, is what we mean by an impenetrable and material thing. On the other hand, the opposite experience of free movement, contrasted with the idea of a possible extended resisting something, gives rise to the idea of empty space.

The different degrees and modes of impenetrability such as hardness, elasticity, fluidity do not present special difficulty ; but the idea of *extension*, here supposed is itself very complex, having to be constructed by putting together the results of many separate sensations and perceptions. We have therefore to consider how we get

§ 84.

Extension of things perceived.

II. The understanding of *extension* as an attribute of resisting things (which is necessary to their being understood as resisting and impenetrable) ; or, in other words, how the idea of a *resisting something* comes to be elaborated at last into an idea of an *extended something*, occupying (*i.e.*, resisting motion through) a definite extent of space. It may be explained in this way—

In understanding a thing as extended, we understand it as composed of *an aggregate of resisting points or particles external to one another and to the thinking self, and yet existing simultaneously, and resisting motion through themselves*

while admitting of motion along and round about them collectively, e.g., a block of wood or stone, the solid earth beneath our feet. Hence to get the idea of an extended thing, the idea of *resistance* has to be combined into one aggregate with the ideas of *plurality* and *co-existence* of parts, and of *motion* along and round them (for it is this simultaneous existence of many constituent points or parts that distinguishes an *extended* thing from a *succession* of events in time). And experience of free movement is necessary to give the idea of open space, and resistance to movement to give that of filled space. And to be extended in space the thing must be such as to resist movement at many contiguous points, while the resisting points, though experienced successively, must be conceived as existing permanently and simultaneously. Hence to arrive at the idea of an extended thing, it is necessary to put together in thought the ideas of movement, of resistance to movement, and of the continuity and co-existence of many resisting points.

(a) We consider further, therefore, how we acquire the understanding of distinct units as *existing simultaneously*, or how we learn to combine the idea of existence with that of the co-existence of the resisting points.

Now movement along a series of resisting points (such as the edge of a table) gives these points only in succession to one another; so that these experiences of resistance are understood only as *events in time* (whereas an extended thing must be understood as composed of *co-existent* resisting points). And it is evident that experiences of succession can never of themselves be made to yield an understanding of co-existence, which is the opposite of succession. 'For time and space, though correlative, are distinct ideas, and must have distinct beginnings in experience; we cannot derive the one from the other).

But this idea of co-existence can be derived only from those senses which (by their attribute of local discrimination) give several distinct units of sensation *simultaneously*, viz., *touch* and *sight*. Thus the eye can distinguish several stars simultaneously as distinct points of light against the dark background of the sky, even without any movement of the eye-balls; and by the local discrimination of the skin we can distinguish several different touch points experienced simultaneously, e.g.

(a) Obtaining the idea of co-existence of parts,

From simultaneous experiences of touch-points (and vision points,

the points of compasses, or the finger tips of one hand pressed against the palm of the other.

(Some seem to think *e. g.* Spencer, that the idea is attained by experiencing points successively, oscillating backwards and forwards between them, and finding the same points always recurring. But without our already having the idea of co-existence, the recurring points could not be understood as the same points ; they would appear to be different).

Such distinct but simultaneous experiences, therefore, (contrasted with experiences of movement and succession), will give some preliminary understanding of co-existence. But this does not of itself amount to an idea of extension in space, because *that idea includes also the idea of possible movement between and around co-existent resisting points. Hence the idea of co-existence will have to be combined with that of movements before we can attain to the idea of space and of extended things.* (Though some have thought that the mere feeling of extensibility which is peculiar to some sensations, is itself a rudimentary presentation of space).

(b) And experiencing parts successively by means of movement, and finding by reversal of movement that they always recur,

(b) The next step, therefore, is to combine the idea of co-existent points with that of possible movement, into one complex idea of an object extended in, or occupying a certain extent of space.

Suppose, again, that a moving limb encounters a series of resisting points, *a, b, c, d*, (*e. g.* the finger, in moving along the edge of a table). These contacts, we can see, are only a series of events in time, for though every one of them gives a unit of external reality as resisting the self, yet each passes away before the other begins. Of themselves, therefore, they give no notion of the permanence of the points of contact.

But suppose that the movement is reversed, giving the same experiences of resistance, but in the reverse order, *d, c, b, a* ; and also that the movement forwards and backwards is repeated several times, giving always the same series, only in opposite orders *a, b, c, d,—d, c, b, a*.

And explaining recurrence by representing them as co-existent,

Then this repeated recurrence of the same units of resistance will impress the mind as requiring explanation ; and prompt it to apply to these successively experienced points its already acquired notion of co-existence, and to explain their recurrence by thinking of them as co-existent, and as capable of being experienced simultaneously (if only the surface of the perceiving organ were large enough).

§ 85.

Modes of extension.

Now this process of interpretation gives us an understanding of—

(i) *Linear extension*, for an aggregate of resisting points experienced successively by means of muscular movement backwards and forwards in the same and opposite direction, but conceived as existing simultaneously and capable of being perceived simultaneously (*e.g.* the edge of the table)—constitutes what we understand by a *line*, and involves an understanding of *linear extension*, or extension in *one dimension*

Thereby obtaining (i) the idea of a continuous series of resisting points, existing simultaneously while experienced successively, which is a line,

The acquirement of this idea is probably rendered easier by those cases in which the resisting points thus successively experienced, are on the surface of the body itself, as in drawing the finger of the right hand along the palm of the left. For in this case, there will be a consciousness not only of the moving hand and its successive feelings of being resisted, but also of the resisting points themselves, *a, b, c, d*, and their feelings of *resistance*. These latter will linger simultaneously in memory, and keep up the idea of co-existence, and help us to combine it with the idea of movement.

And from the above we can see how the different modes of linear extension come to be understood —

The *length* of the line, or *magnitude in one dimension*, will be judged by the *quantity of muscular exertion* in the form of movement (*i.e.* the combined *degree* and *duration* of the effort) required to move the limbs along all the units composing the line, from the one end to the other, *e.g.* a yard will require three times as much as a foot, and so on. Thus we can distinguish very clearly between distances which can be walked in five minutes an hour, and a day, by means of the consciousness of time and muscular expenditure required. These experiences together, then, constitute our measure of *real distance*, and therefore of *linear magnitude*.

Having length,

The *direction* of the line will be distinguished at first by the different *qualities* or *kinds* of muscle-feeling experienced in following it. Thus different directions, upwards and downwards, right and left, inwards, and outwards, exercise different

Direction,

muscles, giving different *kinds* of muscle-feeling by which these directions can be distinguished from one another.

And form.

The *form* of the line, again—straight, curved, and so on—will be distinguished by the transition, gradual or abrupt, *from one direction to another*, *i. e.*, from one kind of muscle-feeling to another. In the straight line, the muscle-feeling felt continues the same throughout; in curved lines, there is a gradual, and in angular ones, an abrupt transition from one *kind* to another, marking different directions.

Thus the *kind* of muscle-feeling (depending, as it does on the muscles exercised) is our criterion of direction and *form*, as its *quantity* is our measure of distance and magnitude. And the *position* of a point will be determined by the length and direction, taken together, of the line or lines connecting it with other points. And a similar combination of ideas, only more complicate, leads us to the conception of

And (ii) by combination of many such, the idea of a resisting surface,

(ii) *Surface extension*, for we may suppose a plurality of lines of co-existent resisting points, extending upwards and downwards, right and left, and round about, and capable of being followed by the hand when stretched at full length, and therefore at the same distance from the body; and may suppose that they have been experienced several times in reverse order, and found always to recur as before. Then this plurality of lines, also, will have to be explained by our applying the idea of co-existence, and conceiving them as a co-existent aggregate of resisting points at the same distance from us; and the result will be a conception of a resisting *surface* or *plane*, and of extension in *two dimensions*. For the primitive idea of a surface is that of a connected system of co-existent points resisting the out-stretched hand, such as is presented by a wall or closed door.

Having magnitude and form;

And the *magnitude* of the surface will be judged by the *duration* and *degree* of energy in the form of movement, needed to move over or round it. Hence the difference to us between a square foot, a square yard, and a square mile, is ultimately a quantitative difference of muscle-feeling combined with time.

The *form* of the surface, again, will be known by the successive *directions* (or different kinds of muscle-feeling) experienced in following the peripheral line—the triangle, square, circle, etc. all giving different series of feelings, marking different directions. A further step in the same line of thought leads us to—

(iii) *Solid extension*, which supposes an understanding of the third dimension, *viz.*, *depth* or *distance outwards*, and power of combining the three dimensions (which are by themselves abstractions) into the idea of a concrete *solid object*, *i. e.*, one occupying space so as to resist movement from all directions. Thus we can perceive depth or distance outward by moving the hand outwards and inwards, and thus conceive a *plane* running from ourselves outwards. By moving it both outwards and inwards, and upwards and downwards, we conceive a *perpendicular plane* stretching outwards; and by moving outwards and inwards and right and left, we conceive a *horizontal plane*. Then, by combining perpendicular and horizontal planes, we can conceive a solid body extended in and occupying space in three dimensions. Thus the cube is a portion of space bounded by six plane sides, and filled with matter resisting motion from all directions.

And (iii) finally the idea of solid or aggregate of parts resisting movement from all directions,

And in proportion as the conception of solid bodies occupying portions of space becomes more explicit, so will the understanding of the *empty* space lying between bodies, and making unrested movement between them possible. By *empty* space we understand *a number of co-existent points admitting of motion through and between them in all directions* (instead of resisting it as the extended thing, or filled space, does).

Solids have may *figures*, and their figures are distinguished by the different directions of their peripheral lines and surfaces—globular, cubical, polyhedral—but they all agree in this, that they occupy a definite portion of space in such a way as to resist motion through it from every direction

Having different figures.

The *distance* between bodies in space will be measured by the *quantity* (*i. e.*, *duration* and *degree* together) of muscular effort which has been experienced (or which would be experienced) in passing through empty space from the one body to the other. Thus we can form no other conception of the distance of the moon or sun than by vaguely multiplying our own past experiences of muscular movements, and the distances we have traversed by our own muscular effort.

And different distances from one another,

The *position*, again, of a particular thing in space will be determined by the *length* and *direction* combined, of the move-

And having different positions in

relation to
one another ;

But capable
of having
their
positions
changed by
movement.

But can we
explain in
this way the
idea of space
itself ?
or are we
assuming it
all the time ?

Different
attempts to
explain it.

Some think
that the
notion of
space must
be filled in
by thought
itself, *a*
priori.

ments (imaginary lines through space) experienced in passing between it and one, two, or more other things.

And the movements or changes of position of extra-organic things among themselves (*objective* movements, as distinguished from those of our own limbs) will be perceived in two ways : (1) by remaining motionless ourselves and allowing the impression of the thing to pass across the retina or the skin, in which case its motion is known by the different points of the surface successively affected by it ; or (2) by following the moving object with the muscles of the hand or neck or eye, so that we feel the movement of the object by means of our own muscle feelings.

The above may be accepted as an analysis of the way in which we come to understand the extension, magnitude and position of things *in space*. But the question remains whether the idea of space itself can be accounted for wholly in this way. Many seem to assume that explaining how we come to understand the extension and positions of things in space in some such way as above, is equivalent to explaining the idea of space itself. Thus the idea of space may be conceived as merely a general idea of all possible movements of all possible kinds ; or merely of the abstract possibility of movement ; or of some objective condition which makes movements possible. Space, it has been said, is not a property of things, but only a diagrammatic plan of all our possible ways of acting on matter. But others think that such attempts, instead of explaining the origin of the idea of space, assume that we have it already ; and merely explain how, having the idea already, we learn to apply it practically to understand the extent and position of things in space.

Some have attempted to derive the idea from the feeling of extensibility (so-called) which certain sensations, give us. This peculiarity is found indeed, to be due to the extension in space of the external causes of sensations *i. e.*, of external things ; but to understand it as such supposes that we have already the understanding of space and extension. Without this, the extensiveness of sensations would be but a meaningless difference of quality.

This fact, that empirical explanations of space seem all to assume the idea requiring to be explained, has led many to think that the notion of space is a construction *a priori* of the thinking principle itself in the act of thinking its materials, an "read into" them, rather than taken out of them. This much at least is *a priori* in the notion of space : the self must necessarily, as a condition of its thought, think the objects of its thought as things *external to itself and to one another*. This necessary notion of the mutual externality of things, when drawn out and made more explicit by the experience of movement, gives what is most elementary in the idea of space.

§ 86.

In conclusion it may be observed that tactuo-muscular perception has these points of superiority over other forms of perception—

(1) That it gives a more immediate, intuitive, irresistible conviction of the *existence* of extra-mental objects than any other form of perception ; and, being less subject to illusions than the perceptions of seeing, hearing, etc., it is commonly appealed to as the surest criterion of objective reality (though illusions even of touch are not unknown) ;

(2) That it alone gives a full and complete understanding of the *materiality* of extra-mental objects, *i. e.* of those primary qualities which make external objects to be material things (as they might be *extinct* without being *material*.) For though vision gives, we shall find, some of the geometrical qualities of matter (*viz.* extension and position in space of two dimensions), it fails to give the third dimension, *viz.*, depth or distance outwards from self ; and gives no direct perception at all of the dynamical qualities of things, resistance, impenetrability, etc.

Tactile perception has, however, this defect, that it can reveal the existence of those objects alone which are within the range of movement and can thus be brought into immediate contact with the organism ; whereas vision, hearing, and even smell, have the advantage of revealing (though only *indirectly*, or by *inference*) the existence and qualities of distant things. And it is vision more especially that supplies what is wanting in touch. Hence we have to consider next—

Visual Perception of Qualities.

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§ 87.

Vision is the highest of the senses in respect of discriminative sensibility, giving finer differences of *quantity*, *quality* and surface *extension* than any other sense. And, if we compare it with touch in importance as a source of knowledge, it will be seen—

(a) That it agrees with touch in giving *directly* an understanding of space in two of its dimensions—*linear* and *superficial*—while surpassing it in giving much finer discriminations

Thus knowledge of material things rests mainly on active touch.

Because it gives the impenetrability of things,

And is of all the senses the least liable to illusion.

But gives only things in contact with the organism.

Vision is indeed superior to touch in some respects ;

of points and of relative distance, direction, and position of points in line and surface, than touch can do.

But fails to give the most fundamental properties of matter directly.

(b) It is inferior to touch, however, (1) in this respect, that it fails to give *directly* the third dimension of space, *viz. depth* or distance outwards from self, and therefore to give an understanding of the *solidity* of external things ; and still more (2) in this respect, that it fails to give *directly* any understanding of the dynamical attributes of things—their resistance, weight, and impenetrability ; and therefore fails to give by itself a full understanding of the *materiality* of external things.

(c) But on the other hand, vision has an advantage over touch, which enables it to supplement, and finally almost to supersede it—it gives a knowledge of *distant things* beyond the reach of movement and touch.

Yet it supplies more data for direct perception than any other sense.

It cannot do so by *direct* perception indeed, because directly it gives no understanding of distance outwards (movement of the limbs, combined with touch, being the only measure that we have of real distance). But it does it by making possible an acquired power of *indirect* or inferential perception. For by the richness of its discriminative sensibility, it gives numerous visual characteristics of things which become associated in thought with their real distance, magnitude, solidity, and dynamical qualities (weight, impenetrability, *etc.*). Hence, when these visual characteristics are *presented*, they bring the real distance, magnitude, *etc.* of the things before the mind in *representation* ; and enable them to be *thought* and *inferred* almost as rapidly and vividly as if they were themselves presented, and directly perceived. This power of inferring and representing qualities from those presented is sometimes called *acquired* perception.

§ 88

Visual perception supposes both the optical,

Two sensibilities of the eye.—But there are two kinds of sensibility connected with the eye, *viz.*— (a) The *optical* or *retinal* sensibility, which is peculiar to the eye—the consciousness of light, colour, and shade—occasioned by rays of light emanating or reflected from the object, and *focussed by the lens upon the retina*.

When we turn our attention upon an external object, we roll the eye-ball so that the light from the object, passing through the centre of the lens, may fall on the *yellow spot* near the centre of the retina, where the surface layers of retinal nerves and cells thin away, leaving the layer of crystalline cones more exposed to the light. This is therefore called the line of

direct vision or attention—object, centre of lens, yellow spot—while adjacent objects fall on surrounding points of the retina, and are vaguely seen, or *glimpsed* by *indirect* vision.

(b) The muscular sensibility arising from the activities of the muscles of the eye—the external four *recti* (or straight) and two *obliqui* which roll the eye-ball in its orbit, and the internal *ciliary* which regulates the convexity of the lens so as to focus light from different distances on the retina.

And the muscular apparatus of the eye.

These muscles are richly supplied with both *out-carrying* and *incarrying nerves*, which give a consciousness of the slightest differences of effort and movement. And these muscle-feelings of the eye combine as sources of knowledge with the purely optical sensibilities of the retina and optic nerve. For the qualities given by the optical sensibility, *viz.* light, shade, and colour, are only *secondary* qualities; the co-operation of muscle-feeling in the form of movement is necessary to give an understanding of the coloured object as *extended*, or to make shade and colour understood as attributes of an *extended* thing, and to give the direction and position of the thing.

The retina by itself gives only light and colour.

§ 89.

Muscular sensibility of the eye.—Hence, seeing that the optical sensibility *by itself* gives only secondary qualities, the main thing to be explained will be: how the optical and muscular sensibility together give an understanding of one *primary quality*, *viz.* *extension*, though only in two dimensions. For we can understand in this way the

But retina and muscles together give extension in two dimensions—

(a) *Co-existence of points.*—The *local discriminativeness* of the retina will contribute to this end, by first contributing (as that of the skin does) to the understanding of *co-existence*. For every point has a certain local characteristic of its own, by which its sensations are distinguishable from those of other points. Now several points on the retina may be affected simultaneously, and at the same time felt to be distinct from, and outside of one another. They will thus be felt to be external to one another, and co-existent at the same time. This combination of externality and simultaneity gives the idea of co-existence. Hence

The retina giving points of light and colour simultaneously, and thereby co-existence,

(b) *Line and surface.*—Now suppose that the eye-ball be turned in its orbit, so as to bring a number of luminous points, *a*, *b*, *c*, *d*, successively on the yellow spot (*i. e.* into the line of direct vision). This consciousness of successive

The muscles bringing points successively into line of direct vision, in

different
orders,

Those of
reversible
orders being
interpreted
as co-exist-
ent,

And there-
fore consti-
tuting
lines and sur-
faces.

But vision
give no direct
visual percep-
tion of third
dimension,

As proved by
evidence
derived from
persons born-
blind;

points will give only events in time, each passing away before the other begins; but if the movement be reversed, and be found to give the same series of optical points, only in reverse order, *d, c, b, a*, then we shall be prompted to apply our idea of co-existence, and explain this series of experiences by thinking of a plurality of *co-existent* objective points admitting of motion backwards and forwards between them; *i. e.* by thinking them as a *line*—involving an understanding of extension in *one dimension*. (This conception will be attained more easily, perhaps, in the case of vision than in that of touch, for this reason; even while the visual attention is fixed upon the one point which is in the line of *direct* vision, *viz.*, *A* several other points, *b, c, d*, will be making themselves vaguely felt at the same time on the outer parts of the retina—thus helping us to understand them all as *co-existent* with one another and with *A*, and as forming the line *A, b, c, d*. And the line will be felt as straight, curved, or jagged according to the muscular movements experienced in following it with the eye.

When the understanding of lines of co-existent points has thus been attained, it will be even easier in the case of vision than of touch, to attain to the understanding of a *system* of co-existent lines and points, and thereby to an understanding of *surface* extension. And the shape of the area—square, round, elliptical—will be given by the muscle-feelings experienced in following its peripheral line.

But vision by itself can give no understanding (*i*) of the third dimension of space *viz.*, depth, or *distance* outwards, nor therefore of the *solidity* of things; because, though the eye can roll in its orbit so as to bring different points into the line of vision, it cannot move *forward* out of its orbit, to give any experience of distance outwards. An understanding of these can be obtained only by muscular experience; but the appearances which things present to the eye supply premises from which we learn to *infer* their distance, solidity and magnitude, and that, so rapidly and spontaneously that we think we actually see them.

For the understanding of distance outwards, the third dimension and solidity of things, is obtained by active touch and not by vision, seems to be proved experimentally

by certain cases of persons who were born blind, and obtained power of vision in mature life by operation. To these the world appeared as a flat surface of various shades and colours, pressing on the eye from without, and thus giving the feelings on its own not-selfness; but giving no understanding, at first, of distance and solidity. That had to be acquired gradually by associating visual with motor experiences, and inferring the latter from the former. One patient stated that in first looking at things he felt a sensation in the tips of his fingers as if he were handling them. This implies that visual experience, which was new to him, was already beginning to suggest tactful experience with which he was already familiar. After a time the association would become complete, and the person would think that he has learnt by sight what he has really learnt by active touch.

(ii) Nor can vision by itself give the real magnitudes of things, but only apparent or retinal magnitudes; because the impressions which they make on the retina are large or small according to the nearness or distance of the object. By the eye we get the *apparent* or *retinal* magnitude of things (in two dimensions) which will be measured by the *quantity* of ocular movement needed to bring the opposite ends of their sides, one after another, to the centre of direct vision. The forms of surfaces, are distinguished by the different *kinds* of ocular movement needed to follow their peripheral lines. And when we know the distances of things we can infer their real from their apparent size.

Thus the distances and magnitudes which the eye can give are only *angular* ones. By turning on its axis it measures (with its muscle-feelings) the angles subtended by distant things and by the distances between them, and thereby measures their *relative* and *apparent* dimensions, and distances from each other; but it cannot move outwards from its orbit to experience their *actual* magnitudes. But their *retinal* or *apparent* magnitude will be found to supply a premise from which their real magnitude can be inferred when their real distances (as measured by limb-movement) are already known; and by which their real distances can be inferred when their real magnitudes are already known, given indirect perceptions.

(iii) *Binocular vision*, or the co-operation of the two eyes in the production of one mental image, present some points of difficulty. Each eye is capable of giving an image of the object; but when the eyes are concentrated on the object so that the light from it strikes the central spot of each eye, (or in other words when the object is in the line of direct vision of both eyes at the same time), then the two retinal

And no real, but only angular and therefore only apparent magnitudes.

But distances and magnitudes can be inferred from signs, supplied by vision.

Visual image enriched by the combination of two images in consciousness, given by the two eyes.

images coalesce into one image in consciousness. When one of the balls is turned aside so that the light strikes on any other part of its retina, then the coalescence fails, and two images are seen.

Up and down determined by tactuo-muscular perception.

But do these perceptions explain fully the idea of space?

The question is often asked ; Why, with the image on the retina inverted, do we see the object upright? The question however involves a misunderstanding. Our *conscious* image has nothing to do directly with the retina, but with an unknown process in the brain. And the position of the mental image is determined not by any image on the retina, but by the relation of the object to our body as a whole, as experienced by tactuo-muscular perception, which is the ultimate criterion of the positions, sizes and shapes of external things.

The idea of space.—The above then are the ways in which we adapt ourselves to space and its relations. Empirical psychologists try to show that the idea of space is nothing more than a condensed or abbreviated idea of possible movements of all kinds, such as we have experienced in the past. But there is certainly more in the idea than this. To understand movement, we must think of something which gives connection to all the parts of space, and produces that unity and continuity which makes movement possible. It can hardly be maintained that this unity and continuity of space is an object of experience. It is rather a necessary notion supplied by the understanding to fill up what is wanting in experience. Hence some have held an *a priori* theory of space,—that it is not learnt by experience, but supplied by the understanding itself.

Perceptions of Hearing.

§ 90.

As touch and vision give the elements out of which space is constructed, so hearing gives those of succession in time.

Sound, with its distinctions of tone and timbre, is only a secondary quality, not *directly* resembling anything inherent in the object. What is in the object is merely vibrations of its materials, which communicate themselves to the atmosphere and thereby to our ears and brains. These vibrations thus communicated in some form to our brain centres, give rise we do not know how, to sensations of sound. But these sensations of sound nevertheless give us certain perceptions. Thus (1) we perceive that there is something not ourselves which imposes these sensations upon us, and (2) that these sensations succeed one another in time. Thus, alone with the sounding something, hearing gives a clear perception of time. Time is the common form of all *events*, mental and physical. All the senses indeed give successive events, and therefore time. But hearing appears to give the clearest

measurement of it—giving successive units, durations, and intervals of sensations, more distinctly than any other sense. This is probably owing to the structure of the organ. The tremors communicated by the sounding object to the atmosphere, and by the atmosphere to the ear, have to be transmitted across the slender bridge of bones to the cochlea—from which it follows that the units of sound must be more purely successive than those of any other sense. (Our appearing to hear several sounds simultaneously, therefore, must be accounted for by the property of *duration*, *i. e.* the property which sound-sensations have of lingering for some time in consciousness as *after-images*, after their objective causes have ceased). Hence

How the succession of events in time comes to be understood.

Succession.—The understanding of succession may be explained to some extent in this way.—When a shock of sensation, A, has been experienced, but its objective cause (in a case of sound, the vibrations of a solid body communicated to the atmosphere) has ceased, then the after-image of the sensation, *viz.* a, will continue to linger for some time in consciousness before it sinks beneath the threshold. Suppose now that another shock of sensation of the same kind, *viz.* B, be experienced. Then the actual present sensation, *viz.*, B, and the lingering remnant or vestige of former sensation, *viz.* a, will both be present in consciousness simultaneously, and the contrast between them will rouse the attention, and compel the mind to explain a by thinking of another sensation which was once present and actual as B now is, but which has ceased to be present and actual. In this way it will awaken us to a consciousness of the difference between what is *now* and what is *no longer*; or between the *present* represented in actual sensations such as B, and the *past* represented in lingering traces or after-images of sensation, such as a. Here, then, we shall have the rudiments, at least, of an understanding of succession, which calls forth—

And makes the idea of time to rise in the mind.

The idea of time.—The explanation thus suggested by the lingering *after-images* of sensations before they have sunk below the threshold of consciousness, will soon be extended to *revived* images of sensations, *i. e.* ideas raised from beneath the threshold—the events of yesterday, the day before, and so on. These also will be understood as lingering traces of experiences which

But it is open to question whether we obtain our ultimate notion of time itself in this way, or merely

apply a
notion we
already have
a priori.

have been and no longer are. An abstract notion will at last be formed or supplied, of *time* as something containing within it, and making possible, this succession of events, and giving them that connection with one another and with the present which *memory* and *history* suppose. Thus succession is a series of changes viewed against a back-ground which does not change. Hence in thinking of time we have in our minds (a) a notion of events succeeding one another, and (b) a notion of something which gives connection to the events, and makes them to be a continuous series rising out of one another causally; and which is itself therefore independent of the succession of events. Succession by itself is not time, but rises out of time, and reveals time to us, and makes it to be an element of the world of experience.

Hence if we think to derive this notion of *time* itself from this experience of succession in time, our account will be open, it may be said, to the charge brought against the experience-theory of extension, that it assumes, rather than explains, the fundamental notion which it professes to explain—*viz.* the *notion of time* itself. This notion of time must be present in mind before there can be any understanding of the positions of events in time, *i. e.*, of succession. Time is what makes succession possible; it is not succession itself, as the experience explanation assumes. For experience, though it gives the several events, cannot really give the notion of time which makes the events to be understood as successive. Hence many fall back on the *a priori* explanation of time as something supplied by reason from within, in order to understand experience from without (see *Experience and Reason*.)

The other senses—*taste*, *smell*, and *organic sense*—give only secondary qualities, which are of less importance to knowledge, and do not require special consideration.

XVI.

HOW WE PERCEIVE THE QUALITIES OF THE EXTERNAL WORLD: (2) INDIRECTLY.

§ 91.

We have thus far referred mainly to the intuitive element in perception—what we perceive directly without the help of inference. But the meaning of perception is commonly extended so as to include certain cognitions involving memory and inference. For perception is fundamentally the direct cognition of the something external to self which is manifested in every sensation. But the direct cognition comes to be so inseparably associated with other cognitions of an indirect and inferential kind, such that it and they—the intuition and the inferences—at last appear to be one mental act. Thus we have found that every perception of something external comes to be accompanied by recognition, identification, and classification of the thing perceived—e. g., that it is a gun, a crow, a star, or a piece of granite. We have now to add further that it becomes associated especially with cognitions of the spatial relations of the thing, such as its *distance*, *direction*, *figure* and *magnitude*—cognitions that the thing whose existence is perceived is near or far, large or small, north or south, stationary or moving; and these cognitions of spatial relation, being only suggested, will belong to the *indirect inferential* elements of the perception. Thus, when we experience a sensation, we not only perceive that there is some thing outside of us to occasion it, and recognise what kind of thing it is, but infer whether it is near or far, large or small, light or heavy; and these factors, (1) the intuition of existence, (2) the recognition of kind, and (3) the inference of spatial relations, become fused together into one complex mental process, and performed so rapidly and automatically that the whole complex process appears to be simple and immediate, and is included under the one name of perception. These powers of recognising things and inferring the distances and magnitudes of things have to be acquired by experience, and are therefore spoken of as *acquired elements* of perception.

Perception is complex, containing presented and suggested elements—intuition and inference combined.

Every perception gives directly a thing and an attribute, and suggests other attributes, not perceived at that moment.

Among the attributes suggested and inferred even when not perceived are the spatial attributes

We have therefore to consider further these *inferential* adjuncts, of perception. How do we judge the distances, magnitudes and figures of things by vision? Berkeley was the first to analyse the process fully in his "New Theory of Vision." He showed that we do not really *see* distance and magnitude, as had been commonly supposed, but merely *infer* them. The data or premises from which we infer them are supplied by direct perceptions, chiefly of vision and hearing. Hence—

Indirect Perceptions of Vision.

§ 92.

Spatial attributes understood first by tactuo-muscular perception but afterwards suggested by vision.

Vision appears to have this advantage over tactual and muscular perception, that it gives a knowledge of distant things beyond the range of movement and touch. When we stand on the top of a mountain, and look down on the plains below, we seem to be penetrating into the depth of space before us, and perceiving directly the comparative distances and magnitudes of forests, streams and towns, and of the clouds on the distant horizon. Yet we should have the very same impression if we viewed the same scene skilfully painted on a flat sheet of canvas. For what is directly present to the eye in the real scene, as in the picture, is only a flat surface. How is it, then, that we seem to see the distances and magnitudes of the things when nothing is really presented to us but different colours and shades on a flat surface?

We do not, strictly speaking, *see* them at all, because the eye can give no experience directly of distance outwards (depth or the third dimension)—movement of the limbs being the only measure we have of real distance.

Because tactuo-muscular and visual attributes have been experienced together and associated.

But all through our lives while we have been experiencing the real distances, magnitudes, and forms of things by muscle-feeling and touch—while we have been stretching our hand, walking from one thing to another, touching, handling, or moving round about things,—we have also been observing the changing appearances which they present to the eye—their changing retinal magnitudes, their differences of light and shade, their distinctness and dimness, and varying outlines. Now associations have been forming from very early life between these tactuo-muscular experiences of approaching, touching ; and handling things (which give us

their distance, solidity, weight and real magnitude) and the optical and muscular sensations of the eye, which we experience at the same time in looking at them. At last the two sets of experiences, ocular and tactuo-muscular from being so frequently experienced together, have become so associated into one whole of thought, that when any one is presented again, it revives the rest in re-presentation. Thus, when the visual appearances of the thing are presented to us again in sensation, they bring up the size, solidity, hardness, shape and distance of the thing in memory; and we recognise the thing which possesses the visual appearances, as possessing these tactuo-muscular attributes also. In other words, we spontaneously infer that a thing having such and such visual appearances, is at such and such a distance, and of such and such a real size and shape, because we found the same or similar things to be such in the past by motor measurement.

And this inference from visual appearance to spatial relations may come to be performed so rapidly and automatically, that we are not aware that it is an inference, but mistake it for an intuition, and think that we *see* the distance, size, solidity, hardness, etc. of things, though we only *infer* them. Such implicit inferences involved in perception are therefore *acquired* elements of perception.

If this view of space-perception be correct, it will follow that to a person who has been born blind, but acquires power of vision in later life, the world will at first appear as a coloured and shaded surface, close to his eye. It will indeed appear outside his eyes from the first, because he will be conscious of rolling his eyes without being able to produce any effect on what he sees; but will appear to be flat like a picture, and close to his eyes, because he will have as yet no understanding of depth, or distance outwards. This conclusion has been confirmed by the few cases that have been recorded of vision acquired in mature life. And it was a case of this kind that suggested to Berkeley his "Theory of Vision," in which he expounded for the first time the theory that visual perceptions of space are acquired. Before his time it seems to have been assumed generally that we perceive things to be of such and such a distance and magnitude, in the same way as we perceive them to be existent and to be of such and such a colour and outline, that is, intuitively and by vision. We proceed to consider further, therefore,

Whence the tactuo-muscular may be suggested by, and automatically inferred from the visual.

And the processes of intuition, suggestion and inference are integrated into one complex process of perception.

Hence Berkeley's theory of vision.

Confirmed by cases of those who have been born blind, and acquired power of sight.

§ 93.

Visual Distance.

I
What then
are the visual
attributes
which suggest
the distances
of things?

They are
chiefly--

Feelings of
the ciliary
muscle in
focussing for
different
distances;

Feelings of
the external
ocular
muscles in
convergence;

I. How do we learn to perceive thus indirectly *the real distances* of things by vision?—We find that the understanding of distance outwards is acquired by movement of the limbs combined with touch, and that the only measure of real distance is the quantity of effort in the form of limb-movement (together with the time) required to traverse it. Judging the real distances of things by sight, therefore, supposes (1) that we have already had experiences of different distances by limb-movement and time; (2) that we have observed and retained in our minds the different *visual experiences*, which things have given rise to at different distances; and (3) that the *visual experiences* given by things have become associated in thought with their real *distances* (*i.e.* with the muscular effort of the limbs experienced in reaching them), so that the former *suggest*, and enable us to *infer* the latter. Now the principal visual experiences, optical and muscular, which will thus become associated with, and *suggest* the real distances of things (as measured by limb-movement), are—

(a) The different degrees of muscle-feeling connected with the increasing and diminishing of the *convexity of the crystalline lens*, in order to focus, on the retina, the light from objects at different distances. This is done by the fibres of the internal or *ciliary muscle*, which forms a ring about the rim of the lens. The contraction of the fibres seems to dis-tend, and thereby flatten the lens, adapting it to long distances; while their relaxation allows it to return more and more to its natural convexity, adapting it to short distances. And the feelings of the greater or less tension of the ciliary muscle become associated with, and suggest in thought, the actual distance of the object as measured by limb-movement.

(b) The different visual experiences (both optical and muscular) arising from the co-operation of *the two eyes* (in other words, from *binocular vision*) in observing objects at different distances, including—

(1) The muscular feeling of the greater or less *convergence* of the axes of the two eyes. When the object is near, the eyes have to be turned inwards, so that their lines

of direct vision may converge upon it, and this is done by the *external* muscles. The nearer the object, the greater the convergence required ; and the greater the distance, the less the convergence. These different degrees of ocular muscle-feeling will become associated with the different distances as measured by limb-movement when both are presented together ; and the former will afterwards bring or help to bring the latter before the mind in representation, *i. e.*, suggest the distance of the thing.

(2) The differences of optical feeling arising from the greater and less differences of the *two retinal pictures* which have to be fused into one compound picture in consciousness. The nearer the objects are, the greater is the difference of the pictures ; and the more distant the objects, the less the differences. And apart from the difference of the pictures, the combination of them into one mental image probably involves some degree of *mental* effort ; and the greater the differences of the pictures the greater the effort needed for their combination. Now these feelings of difference and effort, also, will vary with different distances and will become associated with the distances as measured by movement ; and will afterwards suggest, or help to suggest them to the mind.

All the above marks, it may be observed, apply only to short distances : because for long ones the curvature of the lens and the retinal pictures will be nearly the same, and the axes will be nearly parallel. They have the advantages, however, of giving a more rapid and automatic cognition of distance than the following marks do, which apply to long distances, and involve a process of more or less *conscious* inference.

(c) *The apparent or retinal magnitude* of the object (or more strictly, the *retinal angle* subtended by it) when the real magnitude is already known. Things of the same magnitude subtend different angles at different distances and their angular or apparent magnitudes, becoming associated with their real distances as first measured by movement, afterwards suggest, and enable one readily to *infer*, the distances. That is, from the apparent size as compared with the idea that we have of their real size, we learn to infer their real distance.

Thus, we learn to judge approximately the distance of a person, a tree, an animal, or a building, because we have

Optical
feeling of the
difference of
the visual
images of the
two eyes ;

But for long
distances.

The visual
magnitude of
the object,
varying with
its distances :

already an approximate knowledge of their size. But we cannot judge the distance of the moon or sun in this way because we do not know their magnitudes.

The clearness or dimness of the object ;

(d) The greater or less *distinctness* or *dimness* of the object in outline and detail: the more distant it is, the hazier and dimmer will it be. This mark enables one to judge approximately the distances of remote objects, such as woods and mountains, even without knowing their magnitude. But such judgments are liable to error, owing to different states of the atmosphere. In an atmosphere clearer than usual, distant objects will seem nearer than they really are; in a hazy one, farther off.

Convergence and parallax.

The above are the more common marks of distance. There are others, however, such as the apparent *convergence* of lines known to be parallel (e.g., the two sides of a street or road); and *parallax*, or the apparent shifting of the position of objects as the observer shifts his own position, which, like retinal magnitude, is in inverse proportion to the distance—as the shifting of poles, trees, and houses as we pass them in a railway train. Thus the extremely minute displacement which the nearest fixed stars are found to undergo, against the background composed of the more distant ones, as the earth shifts from one side of its orbit to the other, affords a means of judging the distance of the stars when the diameter of the earth's orbit is known.

§ 94.

Visual Solidity.

II.
What are the visual attributes which suggest the real forms of things?

These include signs afforded by binocular vision,

II. How do we learn to recognise by vision the *solidity* and real *forms* of things?—To vision by itself all things appear flat, because they are directly perceived only as they are impressed on the surface of the retina. The power of *visually* perceiving their depth and solidity has therefore to be acquired; and it is acquired by forming an association between the *visual experiences* given by objects, and their *real form* in three dimensions as given by limb-movement and touch, so that the former may suggest the latter. And

(a) In the case of near objects, the signs most suggestive of solidity are supplied by *binocular vision*, or the co-operation of the two eyes, converging upon, and giving different images of different sides of the same thing; and consist in (1) the feeling of the difference of the two visual pictures,

and (2) that of the effort of combining them into one complex mental image, together with (3) the muscular feeling of the convergence of the axes. Limb-movement and touch give the *cause* and *meaning* of these different feelings, *viz.* the depth or third dimension of the thing, and its occupation of space in three dimensions. These visual experiences become associated in thought with the tactful and muscular ones, from being frequently combined with them. Hence the visual appearances, when again *presented*, suggest their own interpretation to the mind, by raising in representation the tactuo-muscular experiences which give the real forms of things; and thus the visual impression of the thing comes to be accompanied by an understanding of its solidity and real form.

Hence for short distances the visual impression of solidity is very vivid. For longer distances it is less so, because the peculiar effects of binocular vision hold only for moderate distances.

The effect of binocular vision is illustrated experimentally by the *stereoscope*—a contrivance which casts two pictures of the same object, taken from slightly different points of view, upon the two retinas in slightly divergent directions, so that the axes have to converge slightly in order to receive them (as in viewing a real solid at the short distance). In other words, by mechanical contrivance the flat pictures are made to produce the same effects on the eye as real solid and distant objects do. The difference of the pictures and the feeling of convergence (corresponding to those felt in observing a real solid) are found to produce a vivid illusion of solidity and distance, being associated in our minds with the tactful and muscular experiences of solidity.

(b) For longer distances we depend on the same marks of solidity and distance by which the effects of *perspective* (our seeming to see the relative distances and forms of things in three dimensions) are produced in pictures. A picture is but a plane surface, and yet gives an impression of the solidity and distance of the objects represented. This effect is produced—

(1) By the apparent convergence of the lines and sides of things known to be parallel.—When we look at a cubical body of moderate size, *e.g.* a box, we can see three sides at once, and their boundary lines seem to converge. In looking at a mass of building we see two sides, and their lines (*e.g.* lines of roof and basement) converge as they recede. These appearances interpret themselves to us, so to speak, by suggesting the real forms of the things, as determined by tactful experience. And—

Or the co-operation of the two eyes.

Giving two pictures of the thing, which have to be fused into one.

This is confirmed experimentally by the stereoscope.

And signs included under the name of perspective, such as Convergence of lines,

And light and shade.

And light
and shade.

(2) By differences of *light and shade*.—One side of an object is generally illuminated, and another in the shade; and this visual appearance, having become associated with the real forms of things, suggests its own explanation in the same way. And the above special marks of solidity are reinforced by the usual signs of distance also, because the lines and angles of a solid object are at different distances from the spectator.

§ 95.

Visual Magnitude.

III.
What are the
visual signs
which sug-
gest the real
sizes of
things?

III. How do you learn to perceive by vision the *real magnitudes* of things?—These can be judged visually only when the real distance of the things is already understood. When the distance is known, the real magnitude is readily inferred from the *apparent magnitude*, or *retinal angle*. The greater the distance, the less will the retinal angle be; so that the larger the retinal angle subtended by an object at a particular distance, the larger must the object be.

Chiefly visual
magnitude
when com-
bined with
idea of
distance

But we cannot judge the magnitude of objects, the height of distant mountains for example, from their apparent size, unless we have some means of first judging their distance. We cannot judge the magnitude of the heavenly bodies by merely looking at them, because we do not know their distance.

Difficulty of
judging
magnitudes.

Illusion as to distance leads to an illusion as to magnitude also. When a thing which we know to be more distant, has the same retinal angle as a nearer thing, we know it must be larger. Hence whatever makes us think a thing more distant than it is, makes us think it larger (the retinal angle remaining the same), e.g. objects seen through a mist. A clear atmosphere on the country makes things seem nearer, and therefore smaller. The moon near the horizon seems larger than at the zenith, because the haziness of the atmosphere at the horizon, it is said, and the trees, buildings, etc. intervening, tend to make it seem further off, while they leave the retinal angle the same.

Illusions of
distance and
magnitude.

The above, then, are the principal *indirect* perceptions of vision. Many others, however, might be added. Thus we learn to judge the weight, hardness or softness, of things, and even their temperature, taste, etc. from their visual appearances. Hence to sum up—

Hence the
percept—
a compound
of presented
and represen-
ted elements.

The acquired perceptions in general.—We can thus understand what is meant by the acquired or indirect elements of perception. The appearances which things present to the eye differ according to the distances, forms and sizes of things. These different appearances serve as premises from which we *infer* the real dis-

tances, forms and magnitudes of the things previously learnt by direct perception. Thus when we look at a thing, what we have in consciousness is (a) the colour, shading, surface-outline, and apparent magnitude (retinal angle) of the thing, which are directly *presented* to vision; and (b) our former direct perceptions of the thing revived in *memory* including the tactuo-muscular experiences which give its real size, shape and distance; and (c) a process of spontaneous and perhaps unconscious inference by which we know that the things whose colour, shading, outline and retinal angle are directly perceived by us, are at such and such a distance, and of such and such form, size, weight, etc. And the whole of these presented and represented elements together with the belief that such a thing exists at such a distance, etc. constitute together one integral whole of conscious which is our *percept* and understanding of the thing.

§ 96.

Acquired Perceptions of Hearing.

When objects are such as to produce atmospheric vibrations and give rise to sensations of sound, the quantity and quality of the sensations are found to correspond (1) partly to the *form, magnitude, structure and quality* of the sounding object; and (2) partly to its *position in space, i.e. its distance and direction*, as previously ascertained by *tactual* and *visual* perception. Hence associations are formed between the aural sensations, and the tactual and visual images of things with which the mind is already stored, so that when the former are *presented* in experience, they bring up the latter in *re-presentation*, and thereby give an understanding of the structure, material quality, etc., of the sounding object. Thus—

How far does sound suggest spatial attributes of things;

(1) The different qualities of sound become associated with the material, shape, size, and visual appearance of the sounding object, so that when we hear a sound, it brings at once before the mind the nature of its objective source, and we distinguish whether it is a human voice, or a musical instrument, rustling leaves, a gun, or a bell.

Auditory signs of distance.

(2) The different degrees of sound become associated with the different distances of the sounding objects, so that when the object itself is already known by the quality of the sound, the degree of the sound gives us an indirect perception, more or less accurate, of its distance.

(3) The intensity and clearness of the sound varies also according as it falls *directly* or *obliquely* upon the ear. It is clearest when it falls directly on the ear; less so when it falls obliquely and least so when it falls on the ear opposite to the sounding object. There appears to be a difference also in the quality of the sound according to the position of the head in relation to the sounding object. These differences become associated with, and suggest the direction of the object, as understood by vision and limb-movement.

Acquired perceptions of other senses.

So much for the acquired perceptions of sight and hearing. The perceptions of the other senses are also accompanied by *re-presentative* elements, and therefore by implicit inferences, as, by particular tastes and smells, we perceive the presence of particular substances. But these do not need special consideration.

§ 97.

Illusions in perception.

Perception is subject to illusion.

Illusions arise in connection with perception. In illusion there is a real external thing affecting us and occasioning a sensation in us, and thereby giving us a perception of the thing. The illusion, therefore, does not lie in the directly cognitive or presentative part of any perception. It must lie in the re-cognitive and re-presentative parts—the remembered and inferred elements of the perception—and must be an error of interpretation, not of intuition. We have found that, in perception, we are never satisfied with the mere cognition that our sensation reveals the presence of an external thing; we at the same time infer and picture to ourselves (by recalling past experience) the nature of the thing, and it is in this process of automatic inference that illusion may arise. Thus (as explained before) the sensation present to us rouses other sensations in representation, and we infer that the thing that gives us this present sensation, is capable of giving us these other sensations also (though at present only suggested), and possesses the qualities corresponding to these sensations present and remembered. In this way we think that

we recognise and identify the thing (i.e., perceive not only that there is a thing of some kind present to us, but also what thing it is). Thus the sensation *A* reveals the presence of some thing. It also revives in idea the sensations *b c d* formerly experienced in connection with the thing. We infer from this spontaneously that the thing present to us is the thing possessing the whole set of qualities *Abcd* (i.e. the powers of producing the sensations *ABCD*). This is the ordinary process of complex perception as explained above. Now it is in the indirect elements of the perception—in this process of recollection and inference—that the possibility of illusion lies. For the sensation *A* may be associated with many other sensations, and instead of bringing up *b c d*, it may bring up *l m n*, and we may jump to the conclusion that the thing present to us, instead of being the thing *a b c d* which it really is, is the thing *a l m n*, which it is not. Hence we think that what we perceive is *a l m n* instead of *a b c d*. Thus when we see a straight stick reflected in a pool, we have the same sensations as would be produced by a bent stick, and we think at first that the stick is really bent. This, then, is illusion of perception, and the illusion lies in the inference,—the representative parts of the perception. The reason for the error may be objective—there may be something unusual in the relations of the thing which occasions sensation *A*, and which makes the sensation revive the representations *lm* instead of the normal *bc*, and makes us infer that the thing is *Alm* instead of *Abc*—thus compelling the reviving force of suggestion along the wrong track. Or it may be partly subject—some state of feeling or some current of thought favouring the wrong line of suggestion.

Thus when a superstitious person sees a figure moving silently in the dark, the sight may rouse in his thought the supposed peculiarities of a spiritual being, and he may believe that he has seen a ghost. Or hearing the hooting of an owl he may think that he has heard the wailing of a spirit in distress

“Or in the night, imagining some fear,
How easy is a bush supposed a bear !”

But errors of interpretation arising in the above way—fallacies of perception—are very common, and it is only in extreme cases that we apply to them the word illusion. Long

Illusion however lies in the representative elements only, not in the presentation.

lists of such errors, chiefly of visual and auditory perception, are given in most works on psychology.

NOTE: *Theories of Colour Sensation*.—Two principal hypotheses have been proposed to explain the phenomena of colour:—

Theory of Helmholtz—decomposition of three colour substances, giving three primary colours.

(a) The *Theory of Young and Helmholtz*.—There are three classes of red and cone cells, distinguished by having three distinct kinds of visual substance A, B, C, mixed with their protoplasm which are connected with three kinds of nerve-fibrils contained in the optic nerve.) Ethereal vibrations focussed on the cells set up processes of decomposition in these "colour substances." When they are of such a kind as to affect and decompose only one of them, e. g. A, by itself the process gives rise to the sensation *red*; when they decompose B by itself it gives *green*; when they decompose C by itself, *violet*. Thus red, green and violet are the three primary colours, and are produced by the decomposition of three different substances separately. When all three substances are decomposed simultaneously and with the same intensity, they produce the sensation of white light. When they are not excited at all, there is the feeling of darkness. But these three substances, or any two of them, may be affected and decomposed with different degrees of intensity simultaneously. The many combination of the different incoming currents thus produced, give rise to the many different mixed colours.

Theory of Hering de- composition and recompo- sition of three sub- stances.

(b) *Hering's Theory*.—According to this view also there are three "visual substances." But in each of these substances the vibrations of ether set up either of two opposite processes, *viz.*, decomposition or re-composition. This gives six processes in all: and these give six elementary and fundamental colour-sensations. Thus decomposition and re-composition of substance A, give *red* and *green*; B, gives *yellow* and *blue*; C, gives *white* and *black*. Thus red, yellow and white are sensations of decomposition of colour-substance; green, blue and black, of repair. When in any one substance the two processes go on simultaneously with different intensities, mixtures of the fundamental colours are produced, *viz.* of red and green, yellow and blue, black and white. When in the same substance, the two processes go on together with the same intensity, A or B, then the pairs, pure red and green, yellow and blue, are complementary and, by combining give not colour but white light. When different substances are affected simultaneously in different degrees, the many other mixed colours are produced.

Other and more complex theories have been proposed, but no theory has been found to explain fully all the phenomena of light and colour.

XVII.

HOW WE FORM OUR CONCEPTION OF THE EXTERNAL WORLD—THE ASSOCIATION AND OBJECTIFICATION OF SENSATIONS.

§ 98.

It is through our sensations that we perceive the existence and qualities (powers) of external things. Sensations reveal to us the existence of external things, and different sensations correspond to different qualities of the things, which occasion them. We have therefore a tendency to identify our sensations themselves with the qualities of the things. In other words, we have a tendency to think of sensations as being themselves qualities existing objectively in external things—of sweetness as in the sugar, cold as in the ice, colour as in the flower; and thus to project, as it were, into the external world what are really modes of our own consciousness. This is what is meant by *objectifying* sensation. We thus form our ideas of external things by objectifying the sensations which they give us, and thinking the things in terms of these sensations, *i.e.*, as black or white, hot or cold, hard or soft, heavy or light, sounding or silent, sweet or bitter, according to the sensations which they occasion in our minds. Thus we may be said to clothe the external world in our own sensations and feelings, because we cannot represent it to ourselves in any other way. It is when we begin to distinguish between primary and secondary qualities, and thereby to think metaphysically, that we begin to distinguish between our sensations as states of our own consciousness, and the objective qualities or powers of things which give rise to our sensations. Nevertheless even after we have begun to make this distinction in theory we continue in our ordinary thought to think of our sensations as qualities seated in things. What is really in the things, to be sure, is the grounds or causes of sensations; but we have not the leisure, nor is it practically necessary, to be always making this distinction in our minds. Thus we may distinguish between

(a) Locating sensations in things.—We have acquired a habit of thinking of some at least of our sensations as actually

What is meant by objectification or eccentric projection of sensations?

Understanding of extension and the positions of things in the outer world is connected with our understanding of the localities of sensations in the organism,

For we think of some sensations as states of organism and of others as qualities of extra-organic things,

Thereby objectifying

and localising them.

This is partly illus.
sion.

seated in external things, *viz.*, as states or qualities of the things. In other words, the tendency of popular thought is to conceive sensations not as *effects* merely of the qualities of things (their phenomena), but as the actual qualities themselves; and therefore as seated in the things which they qualify. This we think of the pain of the cut or the burn as actually seated in, (or as a state of) the injured part. We think of colour and temperature as actually in the thing which occasions them, *e.g.*, of the greenness as in the leaf, and of the whiteness and the heat as in the sun. We think the world outside of us as something having the attributes of colour, sonority, touch, taste, smell, and temperature seated in itself objectively. It does not occur to us at first, that these may really be modifications of our own consciousness (qualities in the secondary sense), and not in the external world at all. This is *literally* objectifying and localising the sensations (in imagination at least)—thinking them as objective qualities of things situated in certain localities of space. Thus we localise some of our sensations in our own organism and others in things outside our organism. And this seems to be the common tendency of thought until corrected by reflection and science. It is sometimes called the 'eccentric' projection of sensations. But when we have occasion to think accurately, we fall back on—

But the illusion is corrected by further experience, and localization comes to be understood of the causes only of sensations.

(b) Localising in things the *causes* of our sensations,—we soon rise above this primitive tendency, and think of our sensations as what they really are, *viz.*, as states of our own minds, modifications of our own consciousness; but recognize, at the same time, the fact that they have *objective* causes in some *locality* of space. Thus we soon come to understand that the sensations themselves are in our own minds, and that it is only their *ground* or *cause* that is in external objects; and to distinguish between the sensation itself which is a mode of our own consciousness and the cause of the sensation which is a quality or power seated in an external thing. If we regard sensations in this light, therefore (*i.e.*, not as states or qualities of things, but merely as effects and marks of their qualities, and therefore as their phenomena only), then objectifying and localising them will mean nothing more than our explicitly ascribing them (by an *implicit inference*) to their proper objective *cause*s in their proper positions in space; in other words, learning to understand the position in space, of the objects which occasion them.

§ 99.

Localisation of sensations in organism.

Some are localised in the body, others in the extra-organic world.

But we do not localise all our sensations with the same distinctness in the extra-organic world. It is chiefly our higher sensations such as colour and sound that we thus separate from ourselves, and project, as it were, into distant things beyond

our own organism. Touch and the organic feelings especially we localise within our own organism—we think of these not as qualities of external things, but as seated in, and as states of some part of our own bodies. Hence we must distinguish between intra-organic and extra-organic localisation of sensations—thinking of them as seated in some parts of our own bodies, and thinking of them as seated in distant things.—

I. As to the localisation of sensations *in the organism*.—Every sensation is specially connected with some part of the organism, and corresponds to some state of that part. Hence the sensation becomes so closely associated in thought with the part that gives rise to it, that a tendency is produced to refer the sensation itself to that part, and think of it as seated in, and as itself a state of that part. This is what is meant by localising sensations in the body.

This organic localisation is least obvious in sight and sound, because we have tendency to refer these sensations directly to their extra-organic causes with no thought of their bodily organ. But it is obvious in the cases of taste and smell, which we seem to feel in the tongue and nostrils, and is specially obvious in organic sensations and touch.

How then is this bodily localisation of sensations accomplished? We find that the first sensations to be localised in the body are touch-sensations; and that it is by first having localised these, that we are able to localise the other sensations. This we are able to do by means of movement between the points of the surface where the touch-sensations are felt. Then, having obtained understanding of the surface and different points of the body from movement and touch, we are able to localise the other sensations in the parts already mapped out by active touch.

(a) Hence the first question is: how do we come to understand positions in the body by movement so as to be thereby able to localise *touch-sensations*? When we once understand this, we shall be able to understand how the other sensations are localised in their proper places by being associated with the touch-sensations of these places.

Now the localising of touch-sensations depends on two conditions—(i) It supposes *qualitative differences* of the tactful

How sensations are thought of as states of organism,

And each sensation as seated in a particular locality of organism.

(a)
We must first understand, by movement and touch, the extension of the organism, and the relative positions of touch-points.

This supposes local differences of touch nerves,

And different muscle feelings of different muscles ; localized different touch-points by the different muscle-feelings needed to reach them, Which enables us to

Every touch-sensation suggesting the muscle-feelings, and thereby localizing itself.

nerves, *i. e.* that the touch-nerves supplying different portions of the surface differ somewhat in kind, so that the touch-sensations of different nerves can be distinguished as *qualitatively* different from one another, even when they are experienced simultaneously. Now there are such local differences of quality in touch-nerves and their sensations, and they are most distinct, we have found, on the tongue, lips and fingers, and least so on the shoulders and back.

(ii) It supposes, also, qualitative differences of the nerves of the different muscles and joints concerned in different movements, so that different directions of movement (employing different muscles and joints) may give qualitatively different *muscle-feelings*. In this way the different *directions* may be distinguished by the different muscle feelings which they give (in addition to the quantitative differences which are the index of the *range* of the movements.) And we find that different muscles *do* give distinguishably different feelings, according to the different directions of their movement.

With these conditions, we can understand how the relative positions of *touch-points* on the surface of the body come to be understood. When the child touches any part of its body—its foot, chin, lip, or brow—with its hand, it has, in every case, (1) a locally different sensation of touch in the part touched, and (2) a particular kind of muscle-feeling, or set of feelings, in the muscles employed. And the muscle-feelings will differ in quality according to the direction of the movement, and in quantity according to its length or range. Now the different local *touch-feelings* of parts touched will, by association, gradually become integrated in thought with the different *muscle-feelings* of the hand and arm experienced in reaching and touching them, and will raise them in representation. And these muscle-feelings thus raised in idea will give the *length* and *direction* of the movements needed to produce these touch-feelings.

Hence, when any part of the surface is touched, the touch-sensation will at once bring up before the mind a representation of the *quality* and *quantity* (the direction and length) of the movement of the hand needed to produce that particular local variety of touch ; and this representation (when once the extension of the surface is understood), will be equivalent to understanding the locality of the stimulus. This the locality of a point on the surface is judged by the length and direction of hand-movement needed to touch it, as compared with those needed to touch other points. Touching the knee requires one set of muscle-feelings touching the brow another, and so on.

(b) The other sensations, again, can be localised in their proper parts by being associated with the *touch-sensations* of these parts. Thus a part which has been cut or burnt, can also be touched; and the touch-sensation of the part becomes integrated into one whole with the pain of the cut or burn, so that the latter is localised by means of the former. The soreness of the part coalesces with the touch-sensation of the part, and that has already been localised by movement. Hence internal pains cannot be clearly localised because the parts cannot be clearly affected by touch. Localisation of parts by vision also depends at first on touch—the real position of parts seen is understood at first by touching them; but afterwards the touch sensations of part become so closely *associated* with its visual appearance, that in the latter we read the former, and the sight of the part makes touch superfluous. And there is no doubt that the understanding of the extension of the bodily surface, and of the relative positions of touch-points on the surface, helps greatly towards the understanding, subsequently acquired, of the extension of extra-organic things and their positions in extra-organic space, and the localisation of colours and other sensations as attributes of extra-organic things.

(b)
Then the
other sensa-
tions of body
become asso-
ciated with
the touch-
sensations of
their parts,

And are loca-
lized along
with them.

But why, we may ask, should the touch-sensation itself appear to be seated in the point of the surface touched? It is because there is a tendency to *associate a sensation always with its cause*. Hence, when a movement gives the locality of touch *stimulus* on the surface, mind automatically ascribes the touch sensation also to that part—thinks of it as seated there where its cause is seated. This explains also the tendency to localise colour, sound, etc., in the extra-organic world when it is once found that their cause lie there. Hence—

§ 100.

Localisation of qualities in external things.

II. The localisation of sensations in the extra-organic world.—The general tendency of mind is to *associate sensations with the part or object in which their objective ground or cause is found to lie, and think of the sensation itself as seated there*. This tendency goes so far that we localise some of our sensations outside the organism, in the extra-organic things which we have learnt to think of as their

II
How some
sensations are
thought of as
qualities of
extra-organic
things,

grounds or causes, *e. g.*, colour, sound and temperature. In fact, what we think as the secondary qualities in things are really our own sensations objectified and localised in matter in things by our own imagination—until reflection shows us that this objectification of the sensations themselves is an illusion, and that what is in the things is only the powers of causing our sensations.

viz. as secondary qualities of matter.

When this is understood, then the extra-organic localising of sensations will mean nothing more than knowing the distances and relative positions of the things which cause them. And this is at first we have found, by tactno-muscular perception, and afterwards largely by acquired perception of sight (involving implicit inference). For the things which, when touched and handled, give certain tactno-muscular impressions of hardness, weight, size, form, give at the same time certain sensations of colour, temperature, sound, and perhaps of taste and smell, and the primary qualities become associated with these secondary ones. Then, when the same thing is at a distance, its primary qualities of distance, direction, solidity and magnitude are judged, and the thing with these primary qualities localised, by means of the signs already described; and the associated secondary qualities are localised along with the primary ones.

XVIII.

HOW FAR OUR CONCEPTION OF THE EXTERNAL WORLD CORRESPONDS TO REALITY : THE OBJECT PERCEIVED.

§ 101.

We have considered how it is that we form our conception of an external world, and obtain our belief in its existence. We come to think of space and time, and to think of external things as filling portions of space, and undergoing changes of position and quality in time; and to think of these things as together forming a world by themselves, having inherent in them all the qualities manifested to us in sensations, and having existence of their own, outside and independent of the minds which perceive them. The question how this conception of a world is built up constitutes the properly psychological question of perception. But this leads on necessarily to another question: whether and how far this conception of the world which we form within our minds corresponds to and represents a real world external to, and independent of our individual minds. Or, in other words: granted that perception reveals to us the existence of a world of not-self, what does it really reveal to us regarding the nature of that world?

This question of the objective reality of the material world (like the corresponding question of the substantial reality of self) is one in which empirical psychology (or the study of what is given in consciousness) and metaphysic (or the study of what really exists independently of our consciousness) meet and coincide; because even the science of consciousness (empirical psychology) cannot wholly avoid the question: what is it that we are conscious of? or what is the reality perceived?

We may approach the question from the psychological side by analysing the percept, or mental product of the perceptive process—that which rises in the mind and is directly present before consciousness in the act perceiving (and which we may call the *psychological object*). We may then consider the different hypotheses as to the relation between this mental product and the real *perceptum*, or objective reality perceived in or through the percept (which we may speak of as the

The remaining question of perception is that of the relation between the mental product and the external reality;

How far does our conception of the external world correspond to the objective reality?

Hence distinction between the psychology and the ontology or metaphysic of the question.

metaphysical object). Are we sure that it is real in the sense of existing whether we are conscious of it or not. What is the world which really exists outside and independent of our minds, as compared with the conception which we form of it in our minds? What are we really and directly conscious of in perception? and what it is that exists whether we are conscious of or not? The different answers to this questions are the different *theories of perception*.

Different possible views of the object of perception.

Hence it is necessary to analyse the object of perception.

For it is possible that what we here call the psychological and metaphysical objects may be one and the same thing (as assumed in the more extreme theory of intuitive perception). Or the former may merely represent the latter in some symbolical sense (as according to the phenomenalist theory of perception). Or it may even be maintained that the latter has no existence at all as extra-mental reality, and that there is no real perceptuum or object of perception beyond the mental product itself (as according to subjective idealism). We consider first therefore (A) what that is which is present within the mind in perception, and which we believe to *reveal* external reality (in doing which we shall only be summarising the results of the analytical psychology of perception); and then (B) the question as to the external reality actually revealed. Hence—

§ 102.

The conception analysed.

A.
The mental product of perception includes—

(A) As to what is *present within the mind* in the act of perception.—This will include the conscious *activities* performed by the mind in the act of perceiving, *viz.*, those of cognising, and recognising (with their activities of remembering and inferring, as already analysed) and the self as the subject perceiving: and along with these the common *product* of the processes, *viz.*, the aggregate of sensations and ideas in or through which the external thing is manifested or revealed and the belief at least that in these there is presented to us a real not-self. This mass of activities and products present in the mind, may be considered to be in a sense the primary or immediate object of consciousness in the act of perceiving—the *psychological* object of perception. Thus it may be further analysed into—

The cluster of sensations, presented and re-presented,

(a) The aggregate of associated sensations presented and re-presented—consisting of the actual *present* sensation, and the others which it revives in *idea* (as having formerly been

experienced in connection with it, and which are understood to represent other qualities of the same thing—together with our self as having experienced these sensations.

Thus, most objects are capable of giving us a plurality of sensations, visual, tactful, muscular,ural, etc. In the case of most objects, several or all of these sensations have been experienced simultaneously or in close succession, and may be repeated in any order, any number of times. Hence these sensations (as already explained) become associated together into one permanent whole of sensation, and require to be explained as having their common ground in a *single* objective reality. Thus a fruit, a flower, an ink bottle, a penknife, gives each its own peculiar cluster of sensations, which become associated with one another, to form our concrete picture of the thing, and when one or more of these are given in presentation, they not only give us the *cognition* of a present external thing, but raise in representation the whole associated cluster, thereby giving us the *recognition* of a particular thing with its real form, position and use.

The psychological object.

And the ground-work of the cluster consists of those sensations which represent the primary qualities of the thing—its inpenetrability, extension, form, weight, etc.—and which therefore constitute its *materiality* or essence as matter. The other sensations attach themselves, as it were, to these primary ones as their support. It will include also

(b) The consciousness, or at least the notion and conviction, of *reality, entity or substance*, as something which gives unity and connection to be powers or qualities of which the sensations are manifestations, and imposes the sensations upon us, and which therefore is external to and independent of the perceiving self. For we understand our sensations, presented and re-presented as imposed on us from without, and as therefore as revealing to us the existence of an independent reality having power to occasion them. Underlying the cluster of sensation, therefore, we have the presence of substance or reality as that which gives origin and connection to sensations.

And the notion of substantial reality independent of ourselves as occasioning the sensation.

For we perceive that sensations are not of our own making nor subject to our will, but impressed upon us and sustained from the outside. We are therefore compelled to extend the notion of substance which we derive from our own self-consciousness, and think to another substance external to ourselves as the ground of our sensations and seat of the powers manifested in them.

In perceiving which, psychology and metaphysic coincide.

What is present in consciousness in perception, therefore, is
(a) the present sensation, and other associated sensations

re-presented in idea, (b) the consciousness of our own self as the subject of these sensations and (c) the notion of a substance other than ourselves as the ground of these sensations, to which we may add (d) the belief or conviction that such a thing really exists outside and independent of ourselves. These elements together constitute the immediate object of perception.

Hence conception of external world.

Thus the conception of a not-self which we build up by synthesis of external perceptions comes to be that of a permanent extended reality, existing independent of our own and all other minds, and made up of things having powers and spatial relations corresponding to the sensations which it occasions in our minds. The notion of a substance having the primary attributes of being impenetrable and extended in space, forms the kernel of our conception; and the secondary qualities are thought of as rising in some unknown way out of these fundamental ones. And this mass of consciousness which rises in every perception is believed to reveal and correspond to reality actually external and independent of mind. And this reality external to mind, we call the material world.

The conception's correspondence with reality : the percept or thing perceived.

B
But how far does this construction within and by the mind correspond to reality independent of mind?

(B) Next as to the correspondence between this mental product of perception and the *extra-mental reality* which it is supposed to reveal and represent.—We have come to believe that, in the above states of consciousness within our minds, there is revealed to us a real *perceptum* or reality perceived, which has independent existence of its own outside of our minds and of all mind—and this is what we mean by a *real* external and material world. Is this belief in an extra-mental reality, which accompanies every perception, sufficiently well founded? If it is, in what does the correspondence between the *mental conception* and the *external reality* consist, and how far does it extend? How much does perception really tell us about external things?

This question leads to different views of the object of perception.

This is, no doubt, a metaphysical question; but psychology, in explaining the origin of the belief in an external world, cannot avoid altogether the question of the validity of the belief. And it was on this question that most English works on psychology and metaphysic from Locke to Hamilton and J. S. Mill, mainly turned; and it is the subject also of Kant's *Critique of Reason*. The result of these inquiries was the different "theories of

perception." It will be sufficient to indicate here the chief possible answers to the question:—

I. *Naïve realism*.—In the first place, it is possible to assume that the object outside and independent of our consciousness not only exists, but corresponds *in all respects* to the image or conception which we form of it within our consciousness; so that our conceptions will be copies of external realities in the same sense in which pictures are copies of their originals, or in which images in a mirror reflect the things imaged. We may even go so far as to think that what is directly present to consciousness in perception, is not a mental product at all, but the material reality itself with all its qualities and relations, so that the psychological object and the metaphysical reality are one and the same. What is present in the percept is not a mere picture or representation of external substance, but the substance itself, and not merely sensations corresponding to qualities, but the real qualities themselves as they exist in their substance. Thus it may be said that when we look at the sun, what is present to our consciousness is not a mere mental representation of the sun, but the real objective sun itself. If it were not so, every different person would see a different sun, which is absurd (Reid).

This *naïve* and *dogmatic* realism seems to be the primitive and popular belief; for the first tendency of the mind seems to be to objectify and think its sensations as actual qualities seated in external things, outside and independent of itself. "When we follow the blind and powerful instinct of nature." Hume says, "we always suppose the very images presented to the senses to be the external objects, and never entertain any suspicion that they are but representations of them. The vulgar confound perceptions and objects, and attribute continued existence to the very things they feel and see. The very sensations which enter eye and ear are with them the true objects, nor can they readily conceive that this pen or paper which is immediately perceived represents another which is different from it. The majority can never consent to a double existence and representation."

In other words, they think that in perception we are immediately aware, not merely of a reality present in our sensations which is not ourselves; but also of the essence and

I
Primitive
realism—that
the corres-
pondence is
immediate
and
complete;

What is pre-
sent to mind
is the real
thing with
its qualities,
and not a
merely men-
tal image of
it.

We perceive
things imme-
diately, and
as they real-
ly are in them-
selves.

attributes of that reality as they exist independent of our minds. This view therefore carries the principle of realism in perception to its utmost extreme.

II
Modified realism—that
the corres-
pondence is
literal only in
respect of
primary
qualities.

Modified realism.—A little reflection however, leads to a distinction between the *primary* and *secondary* qualities of matter—between qualities such as hardness, weight, extension, and the like, and qualities such as colour, taste, smell, and the like. It becomes possible, therefore, to think of colour, taste, smell, light and dark, hot and cold, as only modifications of our own consciousness, and therefore as existing only in our minds; and to think at the same time of extension, figure, hardness, weight and the like, as qualities inherent in things outside of our minds (exactly as they enter into the conceptions of the things, which we form within our minds).

Only these
are in nature
what they
are in na-

In this case, then, we think of our conceptions of things as being exact copies of the things in respect of their *primary* qualities; but admit at the same time that there can be no *resemblance of kind* between things and our conceptions of things in respect of *secondary* qualities. What hardness and extension are in thought, that they will be in things independent of thought; but colour, taste, and the like, being only sensations, will have no community of kind with anything outside of thought. The world outside of mind is in itself "neither light nor dark, neither silent nor resonant, neither hot nor cold;" but it is known to be extended in space, hard, heavy and impenetrable.

This is the
view com-
monly as-
sumed in
physical
science.

This *modified* and corrected realism is generally assumed by physical inquirers; and also by many psychologists, chiefly on the ground that the mind is so constituted as naturally to believe in the reality of an extended and impenetrable extra-mental world, and that our mental faculties could not have been so constituted as to deceive us (Descartes, Reid, Hamilton); so that, though we *may* give up the objective reality of the *secondary* qualities, we must still cling to that of the *primary*. Materialistic thinkers also necessarily assume this hypothesis, because only in this way is it possible to maintain the ordinary conception of matter, as an independent reality above and antecedent to mind. For to say that the *primary* qualities as we conceive them have no objective existence, would be the same thing as to admit that matter as we con-

ceive it has no objective existence, and thereby to abandon materialism.

This view also may be combined with the theory of *immediate* perception so far as the existence of the thing and its primary qualities is concerned. We may still argue that we cannot be directly conscious of self and its attributes without being, at the same movement, directly conscious of not self as something impenetrable and extended, *i. e.*, as matter with its attributes. Perception, therefore, is chiefly by means of touch and muscle feeling, because it is they that bring us into most immediate contact with external things, and give us the clearest consciousness of self as acting, and not-self as reacting, and of the primary qualities which make the not-self to be material. Locke and others, however, have combined this modified realism with the inferential theory of perception—that we find the ideas of extension and solidity impressed upon our minds, and *infer* from them the existence of things possessing these qualities.

III. *Phenomenalism* and *Representationism*.—But it is possible to go farther than this, and to say that there is no such essential distinction between primary and secondary qualities as is here assumed—that primary, like secondary, are to us only sensations or feelings of mind, objectified and ascribed to things as qualities and relations, by an automatic act of imagination. As secondary qualities are only possible feelings of colour, taste and smell, so the so-called primary ones of impenetrability and extension are only possible muscle-feelings of resistance and movement; and as such are only modifications of mind, and can have no resemblance of kind to anything extra-mental. They can be nothing more than signs and symbols of something otherwise unknown. Hence in perception we have no presentation, but only representations, of external reality—the object immediately perceived is not really the external things, but only an image or symbol of it.

From this point of view, we may still hold that there is an extra-mental world which is the occasion of our sensations; and even that our sensations, in their change and relations, correspond in some way to external things; and yet hold that sensations and ideas can have no *resemblance of kind* to things as they are in themselves—just as articulate sounds and written characters correspond to and represent ideas of the mind, though they are something entirely different from them in kind. Thus things in themselves, though

Perception of primary qualities is immediate, especially in the exercise of muscular effort.

III
Phenomenalism—
that the
correspon-
dence is
wholly sym-
bolical.

Nothing
mental can
have
resemblance
of kind to
anything
extra-
mental.

they manifest their existence and powers to us in our sensations, remain in their nature *unknown* and *unknowable*.

Nevertheless
an extra-
mental
world exists.

Thus we may admit that the self in perception is directly conscious of being limited and influenced by something which is not self. But we may suppose that the influences of the not-self have to be transformed by the subconscious reaction of the self into something entirely different in kind, *viz.* sensations, before the self can become conscious of them. Hence all that consciousness can tell us regarding the world is that is a not-self having the power of limiting and influencing our minds, and thereby giving rise to sensations in us. But the sensations are mental states, and products of mental reaction, and, though they correspond to things (somewhat as words correspond to thoughts), they can have no community of *kind* with what is non-mental. They are *phenomena* and nothing more.

Hence ph-
enomenal is

This system of *phenomenal idealism* would correspond to the view of Kant in his *Critique of Pure Reason*, if we were sure that by the "things in themselves," which he assumes as the ground and occasion of our sensations, he really *meant* extra-mental things.

It appears to be the view also of Spencer in his "Synthetic Philosophy." According to him sensations are felt to be occasioned by influences of a non-mental world: but the conception which we form of this world is a product of mental construction out of these mental states; and the world itself apart from our sensations is to us only an unknown and unknowable *power*. But Spenser fails to adhere to this phenomenal view consistently, and appears often to assume the objective reality of primary qualities, *viz.* in his doctrine of 'transfigured realism.'

IV
Idealism—
that
the corres-
pondence
between
thought and
world is real
and essential,

IV. *Ideal-realism*.—It may be said that there cannot be two forms of existence, mental and non-mental (mind and matter), each independent of, and external to the other. For, if they were thus independent of each other, neither of them would have anything in common with the other, and there could be no communication between them—mind could not act on matter to cause movement in it, nor matter on mind to cause sensations in it, so that knowledge would be impossible. But we may think that mind is the deepest reality, and that all the substantiality, energy and productivity that is in things, must proceed from a mental power which thinks and wills their order and connection; and that the

ultimate ground of the world therefore must be mental. We may conclude, therefore, that the energy which evolves the *little world* of percepts and ideas (the world of experience) within the finite mind, is identical in kind with the force which evolves the *great world* of nature which is outside of and independent of the finite mind, and of which the *little world* of human thought is a finite reproduction. This view then makes the world to have real existence outside and independent of the finite mind which perceives it, and essentially as it is perceived (realism); but at the same time makes it to be a system of means for the realising of an idea, plan and purpose, and therefore essentially mental and a product of mental power (idealism), and makes perception to be the reproducing in a finite mind of what is already in universal mind (ideal-realism).

In this case, there will be no extra-mental world, if by that we mean external to all mind. Nature will, indeed, be external to finite minds (as it is according to the other hypotheses), but will exist only *in*, and *by* the activity of a universal mental power, working according to plan and purpose. This hypothesis may therefore be called *absolute idealism* or *ideal-realism*.

For what exists in absolute independence of thought could never affect thought so as to make itself known and understood. Mind can know only what mind has produced. The world of our experience can reveal a real world to us only on the supposition that it is a reconstruction of what has already been constructed by mental power, according to laws of mind and reason. Only in this way can the perceiving finite mind find itself in the midst of a world which it can perceive, reproduce and understand; it can know nature only in so far as it finds itself in nature, *i. e.*, in so far as nature is itself a mental product.

This view in its earliest form was expounded by Berkeley, but has been worked out in other forms by the post-Kantian metaphysicians on grounds suggested by Kant himself. And it will have this advantage that, according to it, our ideas of things will really have some resemblance to, and community of kind with the things themselves, both being mental products evolved and maintained by mental power.

V. *Scepticism : Sensationism.* But still another position may be thought possible. From admitting that all knowledge is through feeling and sensation as its materials, it is only another

But it is not a correspondence between mental and extra-mental, because there is nothing extra-mental.

Knowledge, a reproduction in finite mind of what is already mental.

Sensationism and sceptical idealism—that the

correspondence is between actual and possible sensations merely—Hume.

And the world known only as a system of possible sensations.

But this last position cannot be maintained with consistency;

And passes over into materialism

step to say that knowledge is made up of sensations and feelings, and contains nothing more; that nothing is really thinkable or knowable outside the sphere of sensation and feeling, so that all attempts to think what lies beyond sensation will result in nothing but self-deception. The world will therefore be to us nothing more than an aggregate of possible sensations, or a "permanent possibility" of sensation (Mill); particular things, only actual and possible clusters of sensations. The acquisition of knowledge will consist in sensations accumulating and impressing traces of themselves upon the system, so as to be preserved and revived in the form of ideas. Truth and knowledge will consist in nothing but correspondence between these ideal sensations and actual sensations past or future which have been or will be experienced by ourselves or others. Nothing can be known or even imagined about soul and matter as 'things in themselves'; because thinking is nothing but the coming and going of sensations. "Matter itself can be nothing else than a" certain uniform connection of sensations" (Hume).

This is *sensationism* because it makes knowledge to consist in the accumulation of sensations; *scepticism*, because it *doubts* or denies the possibility of knowing the existence and nature of anything beyond sensations; and *associationism*, because it makes things to be but clusters of associated sensations. It is sometimes called *positivism* also, because it claims to restrict thought to *positive* experience, which is held to consist of sensations and feelings alone. This was worked out as a possible way of thinking by Hume, and revived more dogmatically by J. S. Mill, and is probably the legitimate conclusion from purely empirical assumptions.

But it is easy to see that every idea involves more than sensation, *viz.* a power of *interpreting* and *understanding* sensation, and thereby a thinking principle or rational self which is not itself sensation. And as extremes are said to meet, so those who profess this *sensationist* and *sceptical* system (while pretending to know only sensations) are apt to assume that sensations are determined by universal and uniform laws existing objectively, and independent of all mind, and these are identical with the laws of matter; and thereby to assume a *dogmatic* and *realistic* view of the material world, identical with the first or second of the views given above, and with materialistic metaphysic.

§ 103.

Conclusion: what do we know regarding the external world? What then must be our conclusion regarding perception and its object? There is probably some truth underlying every one of the above theories, though every one, taken by itself, is one-sided and incomplete. It is true that in being conscious of self we are conscious at the same time of a not-self as limiting the self. The existence of this external not-self is a fact of *direct* consciousness, not an inference at all. We do not *infer* the existence of a not-self any more than we infer our own existence. But what does our immediate consciousness reveal to us regarding the nature of the not-self, beyond its mere existence? We may understand the question in this way: To say that a finite thing exists is to say that it preserves itself by resisting, limiting, affecting, other things; and another thing can know the existence of that thing only by feeling, and knowing the limitations and effects which that thing imposes upon it; in other words, by the powers which the thing exercises. Therefore self also can know not-self only *in* and by the limitations and effects which are imposed upon self. But it is conscious of these only *in* its sensations. Thus in every sensation and mode of sensation, it is conscious, not only of itself as exercising power, but also of some mode of resisting power belonging to not-self, and therefore of not-self as exercising that power. Still it knows the not-self and its powers (attributes) only in *terms of the sensations which they occasion in it*—i.e., as something present in, and manifested in these sensations. And sensations are only states of consciousness. Therefore the powers (attributes) of the not-self are known only in terms of consciousness, and not as they exist in themselves apart from consciousness. Nevertheless the fact remains that in every form of sense-consciousness we feel the presence of a not-self and therefore of a world other than ourselves, and every mode and change of sensation reveals and attribute and change of that world.

Does this justify the conclusion of Hume, Kant, Mill, Spencer and others, when they say that real things are unknown and unknowable? No. For how could any being know things except in terms of the consciousness in which he knows

What then does our consciousness really tell about the external world in perception?

That is a system of things which preserve themselves by resisting one another and us,

And whose attributes are therefore manifested to us in our sensations.

So that the theory of it being un-knowable is founded on misunderstanding.

Even though it is known to us only in so far as we are

conscious of
being affected
by it.

them ? and in being conscious of sensations, are we not directly conscious of the powers underlying and imposing these sensations, and do not these powers belong to the external things ? And are not the *powers* which a thing exercises so many different applications of the power which constitutes the essence and nature of the thing, and therefore real attributes of the thing ? Do we not, then, in perceiving the powers or attributes which make the thing to be a thing, perceive the thing itself ? For the truth is that finite things have no other nature than that which consists in the power of preserving and developing themselves by interaction with other finite things ; and no existence at all apart from the powers which present themselves to us in our sensations. Are not, then, their existence and qualities wholly revealed to us in our sensations ?

Our know-
ledge real
though only
partial.

We are led to the conclusion, therefore, that sense-perception reveals to us not only the existence of external things, but, to a certain extent, at least, the real nature of things. Things, therefore, are not unknowable nor unknown—their real nature is to a certain extent revealed to us in our perceptions.

The knowledge which perception gives is relative, however, to the depth and comprehensiveness of our sensibility and consciousness. We are not conscious of the *whole* of the influences which external things exercise upon ourselves and other things ; but only of the resultants or collective effects of these influences. In this respect, therefore, our knowledge of external things is partial and superficial—it is not an exhaustive and absolute, but only a partial and relative knowledge. But it is real so far as it goes—things are really present to us and revealed to us in the limitations and effects which they impose on us.

PART V. CONSERVATION.

XIX.

PRELIMINARY ANALYSIS.

§ 104.

Perception, or interpretation of sensations, forms the first step, we have found, in the acquisition of knowledge. The self exists as a mental principle by continuous action and reaction with the surrounding world ; and is thereby undergoing continual changes of state. The consciousness arising out of the changes of state thus imposed upon it is sensation, and varies in kind and degree with the form and intensity of these impressions from without. And the self, in becoming conscious of its changing states as sensations, exercises, at the same time, its intellectual powers upon them, and, in or through them, becomes cognisant *positively* of itself as the subject of them, and *negatively* of a not-self of external world as the ground, occasion or cause revealed in them. Knowledge thus begins with perception in its two forms, *internal* and *external*—the perception of self as a reality directly or intuitively given in self-consciousness, as the subject which has the sensations ; and that of the external world with its attributes and relations, as the not-self and objective ground which gives rise to the sensations.

But the perception of self and world is only the first step in knowledge for this reason, that perception is only a momentary act—the object perceived soon passes out of the range of the senses, or attention is turned to something else, and this particular perception ceases. Now, if percepts thus vanished immediately and left nothing behind them, knowledge would be impossible. Knowledge supposes the results of many perceptions, preserved and organized into a *system of ideas corresponding in order and connection to the system of things constituting the world, and capable of being reproduced in consciousness at any time when wanted.* How then is this possible ? It can be only by—

The first step towards knowledge is the acquisition of percepts of things ;

Giving things with their qualities and relations.

But percepts would be useless if they could not be preserved, and reproduced in some form when wanted.

This is possible only if they leave effects of themselves which can be stimulated into consciousness again.

This is what occurs, and it is called reproduction.

And representation,

Or imagination, in the wide sense of the word.

Which imply the conservation of percepts once acquired.

Conservation of percepts.—This again is possible only on the supposition that the mental principle has not only the power of perceiving things, but also of preserving the results or effects of the perceptions in an unconscious or subconscious way, which is *Retention*; and of reviving or reproducing them again in consciousness in the form, not of *percepts* (which suppose the presence of the object), but of *mental images, ideas, or re-presentations of percepts* (in the absence of the original objects), which is *Reproduction* or *Memory*.

This power of retaining and reproducing the results of past percepts or experiences in the form of ideas, mental images, or representations, is known by various names such as *re-production* (implying that the new consciousness is not indeed identical with the old, but involves a new effort of the mind applied to the effects left by the old); *re-presentation* (because, as the original percept may be said to *present* the thing to the mind, so the renewed form may be said to *re-present* it); and *imagination*, or power of forming *mental images* of things in the absence of the things themselves (for, though the word *image* would apply literally to copies of visual percepts because a literal *image* is a visual thing, yet it may be extended to include all concrete reproductions of percepts—tactual, auditory, and the rest). But the common and comprehensive term for it is *Memory*.

Imagination indeed, in common language, is used, not for all concrete reproductions including memory, but only for those in which the images are reconstructed into new combinations as in poetry and romance; but many writers now use it in a comprehensive way to cover all power of reproducing and re-presenting experiences in the form of *concrete mental imagery*, and therefore to include memory and expectation as well as imagination in the common sense.

The above terms, however, have this defect, that they cover only those elements of past experience which are revived again in consciousness in the form of distinct ideas. It is only a small part of experience, however, that is thus raised again into distinct consciousness. Hence the term *Conservation* is more appropriate for the integrative and retentive functions of mind than the above, because it covers what is preserved in the mind subconsciously; as well as what is raised again in the form of distinct ideas.

§ 105.

Forms of Conservation.—Hence the conservation of past experiences will include the following functions.—

I. *Retention* itself, which is the basis of all the rest—the power of preserving past experiences when we are not conscious of them, in such a way that they may afterwards be reproduced in the form of conscious ideas, or mental images. Thus, for example, we carry about with us in our minds the knowledge of history and science which we have acquired, without being always thinking of it, and of languages which may have learnt without being always reading or speaking them. Indeed we have reason to believe that practically all experiences leave effects or “traces” behind them, which become integrated and incorporated, so to speak, into the organic and mental system, and help to determine its character for the future. In fact, there seems to be no reason why the law of the conservation of forces should not apply to mental, as well as to physical, forces. These effects or traces, indeed, are not all susceptible of being raised into distinct consciousness again as separate ideas and feelings—only a comparatively small number are so revived. The great mass remain latent and subconscious (below the threshold, so to speak). But whatever rises into consciousness—our conscious ideas, feelings, volitions—rises out of the constantly accumulating mass of subconscious contents of mind, and are the products or resultants of them. Thus past experiences and acquisitions, though they may remain below the level of consciousness, may still exist there in a mental form, and may help to determine the collective character and capacity of the mind.

Nevertheless from the obscure mass of latent “traces,” some continue to be so distinct that they are capable of being raised under certain conditions into consciousness again as *distinct ideas* i.e., into memory; and thus retention is the basis of memory proper. Subconscious retention, however, is one of the most obscure and mysterious of all the phases of mind, and, if we understood how it is accomplished, we should understand the whole nature of mind.

II. *Re-presentation, re-production, or memory*, which is the conscious re-production and re-presentation of past percepts of things, in the same form, order, and connection in which

For percepts leave traces of themselves in the system,

Which go on accumulating and modifying the system as a whole;

And some of these can be raised into distinct con-

consciousness again as images of past percepts.

And these images when recognised as images of past percepts constitute memory.

When not recognised they may be called fantasy.

But images of memory can be taken to pieces and put together again in new combinations,

Giving free construction

they were originally experienced, together with the recognition of them as having been experienced by ourselves at some particular point of past time. Memory includes, therefore, the power (i) of *reproducing* and *re-presenting* past experiences of our own in the form of mental images, having the same order and connection as the original percepts; (ii) of *recognising* these images or ideas as *re-presentations* of actual past percepts of our own; and (iii) of referring the experiences which they represent to their proper position (approximately at least) in the series of past experiences, *localising* them, so to speak, in time, (*viz.* in the series of events which have constituted our past lives).

Memory is also called reproductive and representative *imagination*, because it reproduces and represents real past experiences in the form of mental images or concrete ideas. It is not *free* like artistic imagination (by which we construct any ideas that we please), but limited to *facts* by the consciousness of having experienced them, and is therefore accompanied by a feeling of compulsion. It is a consciousness of ourselves as having experienced such and such things in past time.

Past experiences may be reproduced, however, without our recognition of them as having been experiences of ours at any particular time. Reproduction of this kind may be included under *fantasy*, and forms a step to the next phase of conservation. Ideas of past experiences thus revived, whether as fantasy or memory proper, become objects of mental activity, and may be taken to pieces, and put together by it again in new forms, so as to represent possible experiences which we have never ourselves experienced. Hence memory and fantasy are the basis again of—

III. *Reconstruction, or productive imagination*, in which the materials of past experiences are produced indeed, but instead of being left in the same order and connection in which they were actually experienced, are *recombined* and *reconstructed* into images and groups of images, different in form and order from what has been experienced in the past. This process of reproduction combined with reconstruction, may operate as *free* imagination *scientific* and *historical* imagination, and *expectant* imagination or anticipation. Thus—

(1) *Free imagination* suppose, as its condition, the conservation and reproduction of the materials of past experience,

whether it be in the form of fantasy (without any recognition or reference to time) or that of memory proper; and consists in recombining and reconstructing them freely into new images not corresponding exactly to any actual object of experience that has been or will be—images of purely *fanciful* or *imaginary* things and events, and unrealised *ideals* of what might have been, or should be.

This is the kind of construction exercised in romance, poetry and art. When it departs far from the possibilities of things it is called *fantasy* and *day dreaming*. When it penetrates farther into the nature of things, and reproduces in concrete ideas what is probably the inner meaning and aims of nature—the ideally true, beautiful and good, never fully realised, nor fully revealed in outward experience—then it is *poetical* and *artistic* imagination in the highest sense (Wordsworth, Shakespeare).

(2) *Historical and scientific imagination* consists in constructing images of things which we have not ourselves seen, but in conformity with descriptions and evidences supplied to us by the historian and scientist; so that we believe our images to agree approximately with reality as it has appeared to others, and would have appeared to ourselves, had we been present. This kind of construction, therefore, aims at agreement with real experience, being based on evidence and reasoning, and is accompanied by *belief* in the truth of the images produced. Thus when we read of Hannibal's passage of the Alps in Livy, or of the trees and animals of geological times in Lyell, we have to exercise our constructive powers, but in conformity with materials supplied to us, and within prescribed limits which we must not transgress, and we believe that our images correspond to what others have or might have experienced, and we ourselves should have experienced had we been present.

(3) *Anticipation*, or *expectant imagination*, consists in constructing, out of reproduced materials of past experiences, mental images believed to be representations of things and events which will occur in *future* experience—images not of what has been, but of what will be experienced by ourselves and others. Images of anticipation, therefore, are not *recognised* as representing past realities, but *believed* to represent future ones; and the corresponding events, therefore, are localised not in past, but in future time.

of ideas never experienced by any one,

Which is fancy and

Imagination :

Including reconstruction of things and events experienced by others, but not by ourselves,

Which is historical imagination

And construction of future events to be experienced by ourselves and others,

Which is expectation.

Involving inference from the past to the future.

And giving rise to emotions and volitions.

But, as future events are never expected to be exactly like past ones, therefore the images or ideas which we form of them, though made up of materials derived from the past, will have undergone a certain amount of *modification* and *reconstruction*, to make them agree with future conditions. Therefore expectation will have to be included under the head of *productive* or *reconstructive* imagination.

Expectation, therefore, is to future time what memory is to past. But the *belief* which it supposes does not rest on the evidence of past consciousness, but on *inference* from the past experience to the future experience. Remembering that happened in the past, we infer from that, what will happen in the future. Thus, as memory is restricted to facts by the consciousness of having experienced them, expectation is restricted to facts by reason, or power of inference from past to future.

But it is evident, from its relation to reason, that *expectation* or *anticipation of the future*, though it is a process of concrete construction, occupies a different place in the circuit of mental processes from memory and free imagination. The great purpose of thought is to enable us to foresee and prepare ourselves for the future. It consists essentially in using what we know of the past and present as means for reasoning forward to the future. Now foreseeing the future means constructing ideas beforehand of what will happen in the future. Hence anticipation is a result of reasoning, and is the form into which the highest results of thought are cast. And this anticipation of the future is the source again of emotions such as fear and hope, and therefore of desire and motive, and thereby of volition and practical life. Hence anticipation or foresight is among the highest functions of mind being the stage through which mind passes from intellectual to volitional activity—the connecting link between Intellect and Will.

Under Conservation therefore we have to consider Representation, Imagination and Anticipation.

XX.

REPRESENTATION.

§ 106.

Memory, then, is the power of reproducing, in the form of ideas or mental images, things and events formerly experienced by ourselves in reality, and of recognising these images as representations of things and events experienced by ourselves at some point in our past lives.

It implies therefore, (i) the raising of certain ideas into consciousness, and the keeping of them there for some time, as material of thought; (ii) the recognition of these ideas as reproductions or representations of past experiences (percepts), and therefore belief in them as such; (iii) a conception of time, and of the series of experiences in time constituting our past life, as implied in recognition; (iv) reference of the experiences thus reproduced and represented to a more or less definite position in the time-series of our life (a localisation of them in time, because mere revival of images reproducing past experiences, but without recognition and time-reference, would not be memory, but only fantasy); and finally, (v) it includes a consciousness of the self as the permanent subject of these successive experiences in time, for without this, recognition would be impossible, and memory meaningless. For it is memory more than anything else, that brings out the permanence and identity of the self. In reality, "memory is memory of self, and not of things"—or more strictly, remembering a thing is remembering one's self as experiencing of learning the thing.

Thus between memory and perception there is both difference and analogy. In perception we have a cluster of *actual* sensations, and cognise in them the immediate presence and operation of external things. In memory we have a cluster of *represented* sensations, and recognise in them our past cognitions of things. Memory is not, therefore, a reproduction of sensations merely. The sensation is reproduced to some extent in the memory image; but it is not memory unless accompanied by a revival of the *cognition* of the things which operated in the sensations. Therefore memory is of acts

Memory is the power of raising past percepts into consciousness again,

With recognition of them as having been perceived by ourselves, at a certain time in the past.

Hence we can analyse memory into five constituents,

And can see the relation of memory to perception

of perception, not of sensations merely; sensations do not revive without effort of the *cognitive* power to which they are the materials. Memory as distinguished from fantasy as an effort to know.

What then
is the nature
of the repre-
sentation in
memory?

Is it simply
a reproduc-
tion of the
original
sensation in
a fainter
form?

Or has the
idea nothing
in common
with sensa-
tion?

Which may
be true of
abstract
ideas or
motions, but
not of con-
crete ideas.

The memory image.—What, then, is the nature of the *memory image*, as compared with the original *percept*, and with the *sensations* contained in it? (1) According to Hume, the idea of a colour, sound, or taste that I have experienced, is simply a fainter repetition of the original sensation, and differs in nothing except in being less *vivid* and *intense*, *i. e.* in degree only. "The idea of red which we form in the dark, and that impression which strikes our eyes in the sun, differs only in degree, not in nature." Memories are "decaying sensations." Ideas are "faint copies of sensations retained in memory and imagination." This is proved by the fact that the ideas may of themselves rise to the intensity of impressions, as in hallucinations; and impressions may sink to the faintness of ideas, as a slight infusion of sugar in a liquid, a sound at a distance, figures seen in mist or darkness. Thought is but sense-experience in the state of fading away.

(2) But if the difference between sensations and revived images were only one of degree, we should often be unable to distinguish between ideas and faint sensations. A heavy blow on the head would be understood as a sensation no doubt, but a very slight blow might be mistaken for an idea. But no such mistakes are ever made. Hence some have gone to the opposite extreme, and said that the idea has nothing in common with the sensation. 'The idea of the brightest radiance does not shine; that of the loudest noise has no sound; that of the greatest torture produces no pain; and nevertheless the idea represents the radiance, the sound, and the pain, though it does not actually reproduce it.' "Our notions of realities are neither ideas of sensation nor like any sensation. Our clearest notions are not reproductions of sensations."

This, however, is going too far. Our ideas of light, sound, pain, certainly do contain something in common with the corresponding sensations. We must distinguish such concrete ideas from abstract ideas or notions. In the latter, all elements of sensation may seem to be omitted, and only the essence or inner meaning of the idea to be left. Thus, when I

think of a particular virtuous person, my idea certainly includes what I have seen and heard of the person with my senses. But when I think of *virtue*, all elements derived from sense seem to have fallen away, leaving only the abstract meaning.

Hence the truth probably lies between the above extremes. (a) Ideas seem, indeed, to affect the brain, and perhaps the whole organism, in much the same way as sensations; and therefore it can hardly be true that ideas and sensations are wholly incommensurable. The extent to which ideas of memory and imagination mix themselves up with sense-perceptions, making us think that we perceive more than we really do perceive and giving rise to illusions, shows that the sensation and the memory image have much in common. Milton constructed the visual scenery of his poems in his mind after he had become blind to outward things. A certain great musician not only enjoyed, but composed pieces of music after he had become perfectly deaf to external impressions of sound. Such facts show that ideas have much in common with sensations.

(b) But the memory idea is not a reproduction of the sensation merely, but of the percept or act of cognising through the sensation, the thing perceived, which is more than the sensation. For the percept is a mental activity in which mind is conscious not only of being affected by something not itself (sensation), but also of reacting, interpreting, understanding that affection, and adjusting itself to the thing perceived. In memory, therefore, we remember ourselves not only as so affected, but also as reacting and thereby knowing an object. The memory idea, therefore, is not merely a fainter sensation, but a complex idea containing (i) the consciousness of self; (ii) of self being affected in such and such a way; (iii) of interpreting and understanding that impression as revealing an object and of adjusting one's self to the object revealed; and (iv) more vaguely, of the time and circumstances that have intervened; and (v) of a reason for reproducing it at the present moment—some need or want supplied by its reproduction. Thus the memory idea is a consciousness of one's self as having adjusted itself in such and such a way to external circumstances in the past, and of some need for recalling the

For concrete ideas do involve some element of sensation revived,

But contain an active element of cognition and thought,

Capable of being analysed,

past in the present. Hence the element of reproduced sensation may sink to the vanishing point, as in general and abstract ideas, and yet the intellectual reproduction will remain.

And also a mental effort of reproduction.

(c) And further, in sensation the initiative comes from without, and mind is *forced* to co-operate; whereas in ideation the initiative (the reviving energy) comes from within—the idea is a spontaneous mental re-presentation for mental purposes. It is felt, however, to be after all essentially a *re-presentation*—a raising into consciousness of what has already been perceived and is already latent subconsciously in the mental system. It is not a *free reconstruction*, but carries with it a feeling of compulsion. We feel ourselves helpless against the rising idea, just as in perception we are helpless against the external impression.

Hence two problems of memory:

There are evidently, then, two main questions with regard to memory—(1) how past experiences and acquisitions are *preserved or retained subconsciously*, in the interval between their first sinking out of consciousness and their re-representation; and (II) how some are *re-presented when wanted*, in the conscious form of ideas or mental images. Hence we have to consider first—

Retention.

§ 107.

The problem of retention—

The question here is: How are past experiences and acquisitions, after they have passed out of consciousness, retained in such a way as to make their subsequent representation possible, in the form of conscious ideas or mental images?

How is knowledge preserved, when it is out of consciousness?

I visit, one day, the Museum or the Botanic Garden. As soon as I leave the place, the sensations and ideas which it gave me sink out of my consciousness, and are superseded by others. But months and years afterwards, the experiences of that day revive in the form of ideas. Where have they been in the interval? A person may have an extensive knowledge of languages, sciences, or history; but only a very small portion of this is ever present in his thought at once. How, then, does he retain it, and carry it about with him so as to be reproduced when wanted? How are the events of former times preserved when we are not thinking of them? Where are the experiences

